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# Staff Report on the Review of the Sulphur Recovery Guidelines

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Alberta Energy and Utilities Board

**ALBERTA ENERGY AND UTILITIES BOARD**
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## EXECUTIVE SUMMARY

The Alberta Energy and Utilities Board (EUB), with Alberta Environment (AENV) and Alberta Department of Resource Development (DRD), have completed a review of the sulphur recovery guidelines described in *Informational Letter (IL) 88-13: Sulphur Recovery Guidelines—Gas Processing Operations*.

The review was initiated in May 1999, and stakeholder consultation began in September 1999, when the EUB issued a discussion paper (*GB 99-17*) to solicit broad input on the guidelines. The objectives of the review were to clarify

- sulphur recovery requirements for grandfathered sour gas plants,
- the application of the sulphur recovery guidelines to other facilities, and
- proliferation guidelines for small gas plants.

As part of the stakeholder consultation, an independent Sulphur Recovery Guidelines Review Advisory Group (Advisory Group) was established. The Advisory Group, consisting of ten public, environmental organization, industry, and academic stakeholders, submitted its report and recommendations to AENV and the EUB on April 12, 2000. The Advisory Group report made a number of recommendations, including

- phasing out grandfathered sour gas plant approvals,
- providing public funding, through royalty credits, to offset some of the costs of requiring older plants to meet higher sulphur recovery levels,
- applying the guidelines to acid gas streams generated by refineries and upgraders, with some provisions for maintenance and operation flexibility, and
- limiting proliferation of sour gas plants by improving regulatory scrutiny of related applications.

AENV, DRD, and the EUB considered individual stakeholder submissions and the Advisory Group report in developing the following conclusions.

1) While Alberta's air quality standards are being met at current emission levels, principles of continuous improvement and pollution prevention would support upgrading of at least those grandfathered plants that operate at significant capacity utilization. Therefore, grandfathered plants that continue to operate with sustained sulphur inlet rates should be required to comply with current sulphur recovery guidelines by September 30, 2005.

   Sour gas plants experiencing significant declines in throughput should continue to be grandfathered, provided that decline rates exceed 7.5 per cent per year relative to a baseline determined as the peak 1998-2000 calendar quarter-year daily average sulphur inlet.

The province will not provide public funding, through an expanded Sulphur Emission Control Assistance Program (SECAP) to offset some of the costs of requiring older plants to meet higher sulphur recovery levels. The province will continue to pay its share of the processing costs, including costs associated with reducing sulphur emissions, at grandfathered sour gas plants through the existing Gas Cost Allowance system, which reduces royalty for allowable costs.

2) The sulphur recovery guidelines should be applied to facilities, including petroleum refineries and heavy oil upgraders, on the basis of sulphur contained in acid gas streams produced within the facilities. Application of the guidelines should include flexibility to provide for partial-maintenance shutdowns of emissions control equipment.

3) Greater rigour should be required of applicants for new sour gas plants to address facility proliferation issues. Applicants should be required to complete a thorough evaluation of alternatives to process the gas in existing facilities and to demonstrate that all existing facilities in the area that afford technically viable alternatives, regardless of ownership or interest, have been identified and assessed. The affected public should be consulted and included in the review of alternatives to new sour gas plants.

# 1 INTRODUCTION

In May 1999, the Alberta Energy and Utilities Board (EUB), with Alberta Environment (AENV), released *General Bulletin 99-10*, initiating a review of the sulphur recovery guidelines described in *Informational Letter (IL) 88-13: Sulphur Recovery Guidelines—Gas Processing Operations*.

The purpose of the review was to address

- sulphur recovery requirements for grandfathered sour gas plants approved prior to 1988 that do not meet current (*IL 88-13*) sulphur recovery levels,
- the application of the sulphur recovery guidelines to other facilities that handle sour or acid[1] gas, and
- small gas plant proliferation guidelines.

In September 1999, the EUB and AENV issued a discussion paper (*GB 99-17*) soliciting stakeholder input. To assist stakeholder review, the paper provided background on the issues, as well as brief descriptions of example approaches. Stakeholders were invited to respond with their comments and recommendations by letter, fax, or e-mail. In a parallel process, a multistakeholder Advisory Group consisting of representatives from the industry and nongovernmental organizations was formed to examine the various options available and to provide its assessments of the relative costs and benefits. The Advisory Group issued its report in April 2000.

In addition to addressing those areas specifically intended for review, the Advisory Group's report included a recommendation involving royalty credits for capital costs of upgrading sulphur recovery. Given its interest in this area, the Alberta Department of Resource Development (DRD) subsequently joined the review process to evaluate the royalty credit recommendation.

This report summarizes the input received and the views of the stakeholders, the Advisory Group, DRD, AENV, and the EUB for each of the three specific areas examined by the review. A discussion of the findings is presented in Section 6.

An implementation document is also included in the Appendix.

# 2 BACKGROUND

## 2.1 Summary of the Sulphur Recovery Guidelines

*The Sulphur Recovery Guidelines—Gas Processing Operations*, issued in August 1988 as *IL 88-13*, describe sulphur recovery guidelines for new sour gas plants. (*IL 88-13* guidelines for

[1] In this report, "acid gas" refers to a gas mixture containing predominantly hydrogen sulphide ($H_2S$) and carbon dioxide ($CO_2$) that results from the treating or "sweetening" of sour gas.

sulphur recovery in new sour gas plants are summarized in Table 1.) The guidelines are technology based and are designed to focus on pollution prevention and continuous improvement. Both AENV and the EUB have regulatory responsibilities for the facilities covered by the sulphur recovery guidelines. Under its legislation, AENV may set more stringent sulphur dioxide ($SO_2$) emission limits for specific facilities where warranted than those resulting from the EUB's application of the sulphur recovery guidelines.

Based on current ambient air quality guidelines and evaluation of acid deposition with respect to target loads for Alberta, the EUB and AENV are satisfied that environmental protection is being achieved. However, both organizations also believe that the goal of reducing emissions to the greatest practicable level remains appropriate and important.

**Table 1. Sulphur recovery guidelines for sour gas plants**

| Sulphur inlet rate (tonnes/day) | Design sulphur recovery criteria[1] (%) | Calendar quarter year sulphur recovery (%) |
|---|---|---|
| 1-5 | 70 | 69.7 |
| > 5-10 | 90 | 89.7 |
| > 10-50 | 96.2 | 95.9 |
| > 50-2000 | 98.5 - 98.8[2] | 98.2 – 98.5[3] |
| > 2000 | 99.8 | 99.5 |

[1] Deduct 0.3% for quarterly average requirements.
[2] Recovery = 98.18185 + 0.187259 $\log_{10}$ (sulphur inlet rate).
[3] Quarterly recovery = 97.88185 + 0.187259 $\log_{10}$ (sulphur inlet rate).

## 2.2 Grandfathered Sour Gas Plants

When *IL 88-13* was issued the guidelines were not retroactively applied to gas plant approvals in effect prior to August 1988. Therefore the existing sulphur recovery approvals were "grandfathered." When *IL 88-13* was issued, the decision to grandfather existing sour gas plants was made with regard for the cost it would impose on the industry to upgrade the facilities relative to the perceived benefits and the expected remaining operating lives of the plants.

While *IL 88-13* does not require existing plants to be upgraded if their operations remain unchanged, it states that upgrading of grandfathered plants is required if

- the capacities of the facilities are increased, or
- new sour gas connections significantly extend the plant life.

In looking at the grandfathering guidelines, this review examined the 1998 data for 61 grandfathered sour gas plants with approved sulphur recovery at levels less than those specified for new plants in *IL 88-13*. Included in the 61 grandfathered plants are 33 plants that have sulphur recovery facilities (sulphur recovery plants) and 28 plants approved for more than one tonne/day sulphur inlet but without sulphur recovery facilities (i.e., acid gas flaring plants).

A comparison of the current approvals with *IL 88-13*'s guidelines for quarterly sulphur recoveries at approved sulphur inlet rates suggests that eliminating grandfathering at the 33 sulphur recovery plants would reduce approved emissions by 255 tonnes/day, or 51 per cent. However, it is worth noting that on the basis of average 1998 sulphur inlet and plant performance, several of the grandfathered sulphur recovery plants approach or exceed *IL 88-13* sulphur recovery levels. So, while the currently allowed levels for sulphur emissions from the 33 grandfathered sulphur recovery plants would total 495 tonnes/day, actual data for 1998 indicate emissions at 176 tonnes/day. Therefore, based on actual 1998 sulphur inlet rates, the potential reduction in sulphur emissions is closer to 64 tonnes/day, or 36 per cent.

With respect to acid gas flaring (AGF) gas plants, on the basis of approved sulphur inlet, implementing sulphur recovery at the 28 grandfathered AGF plants would reduce approved emissions from 90 tonnes/day to 20 tonnes/day—a reduction of 70 tonnes/day, or 77 per cent. However, again when actual 1998 operating data are taken into account, 13 plants are identified as not requiring sulphur recovery facilities; therefore, the potential reduction in emissions for the remaining plants is closer to 27 tonnes/day.

### 2.3 Sulphur Recovery at Facilities Other Than Sour Gas Plants

While *IL 88-13* was originally intended to apply only to sour gas plants, it has become the benchmark for sulphur recovery expectations for sour and acid gas streams in upstream and downstream petroleum industry facilities. With the issuance of EUB *Guide 60: Upstream Petroleum Industry Flaring Guide* in July 1999, the *IL 88-13* sulphur recovery guidelines were formally extended to include sour flare gas streams at upstream production and pipeline facilities. However, at this time there are no formal requirements as to the appropriate application of the guidelines to other facilities such as heavy oil upgraders and refineries.

### 2.4 Sour Gas Plant Proliferation

The sulphur recovery guidelines in *IL 88-13* become more stringent in removal requirements based on the sulphur content of the feed streams in tonnes/day (see Table 1). It is recognized that sulphur recovery is a cost of developing sour gas reserves, as current market prices for sulphur would generally not support the incremental costs of sulphur recovery facilities. Thus there is an economic incentive to avoid sulphur recovery by constructing plants with less than 1 tonne/day sulphur inlet (no sulphur recovery required). Further, unit capital and operating costs typically increase for marginal increases in sulphur recovery efficiency, particularly at the 2000 tonnes/day threshold (e.g., according to Table 1, quarterly sulphur recovery for a plant designed for 1999 tonnes/day sulphur inlet is 98.5 per cent; however, for 2001 tonnes/day the recovery requirement is 99.5 per cent). These factors create an economic incentive to build a greater number of smaller sour gas plants to avoid sulphur recovery requirements or to construct new plants to avoid increasing sulphur inlet at existing plants across threshold levels for higher recovery. This situation could result in higher total sulphur emissions, greater land use for sour facilities, and greater public and environmental impacts.

# 3 GRANDFATHERING

## 3.1 Stakeholder Views

### 3.1.1 Industry

The Canadian Association of Petroleum Producers (CAPP) said that the sulphur recovery guidelines review needed to be integrated with ongoing Clean Air Strategic Alliance (CASA) initiatives. It noted that current ambient air quality and acid deposition guidelines are being met at current $SO_2$ emission levels. CAPP said that it advocated a careful, considered, and multistakeholder approach to developing a flexible $SO_2$ management system in Alberta that would include emitters from all sectors. CAPP stated that the emissions reductions that would be achieved by ending grandfathering do not justify the costs of upgrading sulphur recovery facilities. However, it supported limiting throughput in grandfathered plants to 125 per cent of the average inlet over the past three to five years. It stated that if this value were exceeded, improved sulphur recovery should only be required for sulphur quantities in excess of the baseline. CAPP said that regulatory and financial incentives should be developed to help operators continually improve sulphur recovery. It supported expansion of the Sulphur Emissions Control Assistance Program (SECAP) for larger facilities in that regard. In its letter of April 26, 2000, CAPP said that it supported the Advisory Group's consensus recommendations. However, in the event these were not accepted, it said that it would continue to support the position summarized above.

Altagas said that it believed that the logic leading to a decision to grandfather sulphur recovery approvals is still valid. It stated that upgrading cannot be justified unless there is compelling environmental evidence that action is needed.

Chevron said that the potential environmental benefits of applying *IL 88-13* requirements to the grandfathered plants appear to be limited and that related technology options are costly. It said that flexibility should be provided and that future reserves potential, economic considerations, and operational criteria should be included in assessing the viability of increasing sulphur recovery at grandfathered plants. It said that upgrading criteria based on the remaining life of reserves connected to grandfathered plants would provide a reasonable approach that considers economic factors. Chevron stated that placing limits on increasing throughput would be less flexible and may discourage plant rationalization. It said that there would also be nothing inherently wrong with continuing grandfathering, albeit with clearer criteria on when upgrading would be required.

Gulf Midstream Service (GMS) said that two distinctly different kinds of facilities are involved in the degrandfathering issue: sulphur recovery plants and acid gas flaring (AGF) facilities. It noted that potential emissions reductions from degrandfathering AGF plants were significant relative to potential reductions from grandfathered sulphur recovery plants. That factor coupled with issues related to flaring, in the view of GMS, indicated that degrandfathering or reducing approvals of AGF plants would be judicious. GMS recommended that a sunset date, about three years from issuance of a decision, be set whereby operators would have to decide to meet *IL 88-13* recoveries by upgrading or approval revision, decommissioning the facility, or undergoing a hearing to consider the case for maintaining the status quo.

Husky said that the outcomes of the review should be consistent with management philosophies recommended by CASA teams and should be integrated with the work of the CASA $NO_x/SO_2$ Abatement Subgroup under way. It said that the effects of increased sulphur recovery requirements should consider related increases in nitrogen oxide ($NO_x$) and greenhouse gas emissions. Husky stated that incremental carbon dioxide ($CO_2$) emissions would be in the order of 2.5 to 11 tonnes of $CO_2$ per tonne of incremental sulphur recovered. It said that regulatory flexibility in motivating emissions reduction must be incorporated into Alberta's emissions management system. It stated that clear grandfathered sour gas plant upgrading requirements should be on increasing sulphur inlet rates relative to actual 1990-1999 values. Husky said that only the sulphur quantities greater than 125 per cent of 1998-1999 inlet rates should be subject to *IL 88-13* recovery rate requirements.

Penn West said that it supported an approach based on requiring plants with longer sour gas reserve supply life to upgrade. It stated that plants with longer remaining lives would be better able to carry the costs related to upgrading. Penn West said that continued grandfathering would provide unfair competitive advantage to plants with large sulphur inlet approvals and low sulphur recovery requirements relative to *IL 88-13*. Penn West proposed an alternative approach that would require all grandfathered plants with sulphur emissions exceeding *IL 88-13* guidelines by more than 2 tonnes/day to improve their sulphur recovery or decrease their plant sulphur inlet volumes. It stated that, based on the 1998 data, the alternative would affect eight sulphur recovery plants and five AGF facilities and would achieve most of the potential emissions reduction from eliminating grandfathering at all plants. Penn West recommended that government royalty relief incentives be provided to offset incremental capital and operating costs associated with upgrading.

Petro-Canada said that while it supported a broad concept of degrandfathering, requiring immediate upgrading of all facilities would be too costly and unnecessary for the related benefits. It recommended that a decision tree approach (as shown Figure 1) be used and that SECAP be expanded to cover capital costs associated with upgrading. Petro-Canada also stated that acid gas quality should be taken into account in determining plant sulphur recovery requirements where operators can demonstrate that a very low acid gas hydrogen sulphide: carbon dioxide ($H_2S$:$CO_2$) ratio limits process capabilities.

Poco (now Burlington Resources) said it strongly believed that there was no need to change the status of existing grandfathered gas plants. It stated that free market forces, competition for gas processing revenue, and acid gas injection technology would cause overall sulphur recovery efficiency to rise. It supported flexible regulatory requirements, such as royalty credits or tradable emissions credits, which would foster optimization in sour gas processing, as well as identification and implementation of innovative emission reduction opportunities.

Rio Alto said that grandfathering should be continued unless substantial increases (30-50 per cent) in sour gas inlet (sulphur inlet) occurred.

Shell stated that the review of the sulphur recovery guidelines should be consistent with the CASA Acidifying Emissions Implementation Team (AEMIT) reports. It noted that the CASA work showed that current acid deposition in Alberta was well below critical loads that would cause long-term adverse effects. Shell supported limiting grandfathered plant sulphur inlet rate approvals to an appropriate baseline that reflects current or recent operating conditions and that

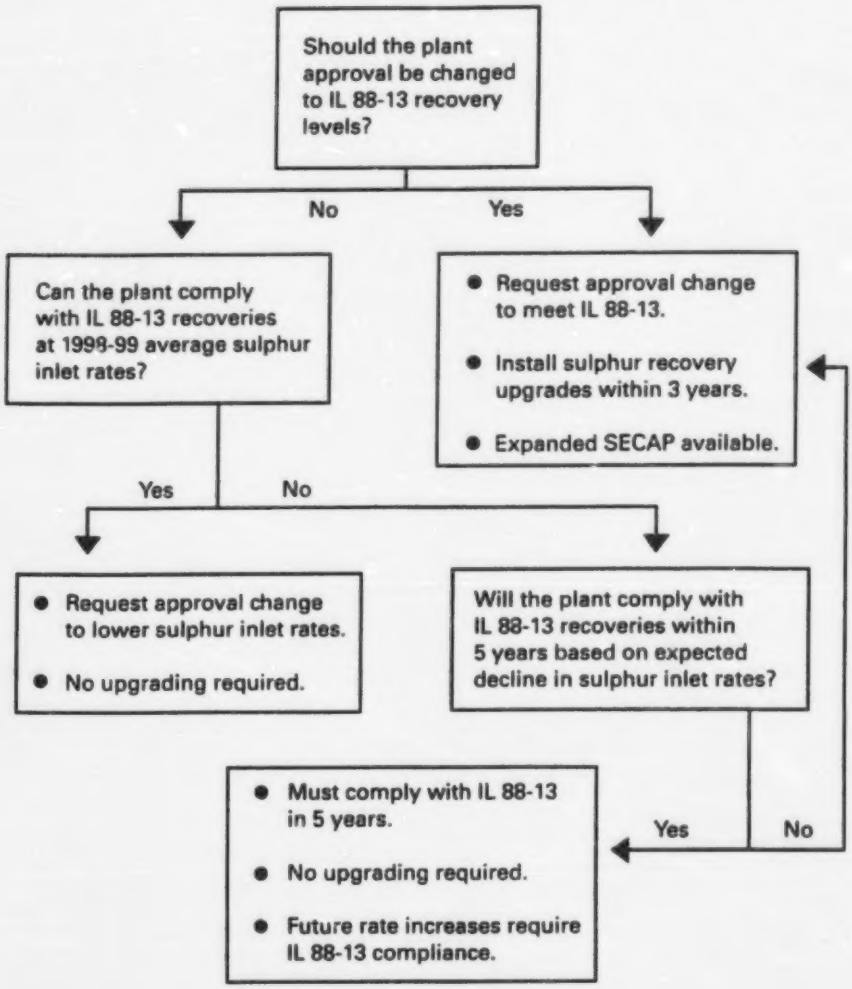
Should the plant approval be changed to IL 88-13 recovery levels?
No
Yes
Can the plant comply with IL 88-13 recoveries at 1999-99 average sulphur inlet rates?
Request approval change to meet IL 88-13.
Install sulphur recovery upgrades within 3 years.
Expanded SECAP available.
Yes
No
Request approval change to lower sulphur inlet rates.
No upgrading required.
Will the plant comply with IL 88-13 recoveries within 5 years based on expected decline in sulphur inlet rates?
Must comply with IL 88-13 in 5 years.
No upgrading required.
Future rate increases require IL 88-13 compliance.
Yes
No

**Figure 1. Petro-Canada degrandfathering decision tree**

includes a reasonable margin (25 per cent) to accommodate fluctuations in production rates. It said that sulphur inlet quantities in excess of the revised baseline would have to meet *IL 88-13* sulphur recovery levels. Shell stated that continued grandfathering would not meet the test of continuous improvement.

Signalta Resources Limited stated that elimination of grandfathering would result in a relatively minimal reduction in emissions at an extremely high cost to industry and Albertans. It said that degrandfathering not only would cause industry to spend in excess of $150 million in non-productive capital but also, through existing gas cost allowance (GCA) royalty deductions, it would cost Albertans in excess of $50 million per year because of reduced government revenues. Signalta said that plants should remain grandfathered unless the plant life index (remaining connected reserves divided by plant inlet capacity) exceeds eight years or if sulphur inlet exceeds 1999 rates by 25 per cent.

Suncor said that impacts related to the incremental emissions associated with grandfathered plants should be understood and that management strategies should address related known impacts. In that regard, it stated that sulphur recovery management should be developed in a regional airshed approach within a CASA context. Suncor stated that limits based on sulphur emissions would be a more effective management tool than limits based on recovery efficiencies and/or sulphur inlet rates. It stated that in the event that the grandfathered plant were to expand its capacity, the application and review process would be initiated and the *IL 88-13* emissions criteria would apply. It said that incremental sulphur recovery was energy intensive and would increase $NO_x$ and $CO_2$ emissions. Suncor stated that sulphur recovery management must take a balanced and integrated approach that considers the relative importance of all emissions. It said that management strategies should be flexible, to enable operators to implement the most effective approaches, and should provide incentives to encourage appropriate behaviour.

Talisman Energy said that it believed that industry had not abused grandfathering and that related facilities were operated close to the capability of installed technology and at substantially less than approved capacities. It stated that a sliding scale for recovery efficiencies should be considered that takes into account the effects of acid gas quality, facility size, and impacts of new $H_2S$ streams when setting sulphur inlet limits. Talisman said that, while continued grandfathering would not be acceptable to all stakeholders, upgraded sulphur recovery should only be required for sulphur inlet in excess of 125 per cent of a base-year's criteria. It stated that the "base" should be derived from a 12-month average inlet in the 1997-1999 period. Talisman said that incentives in the form of emission credits, royalty reductions and experimental technology rebates would encourage greater emissions reductions, at less cost to stakeholders. It noted that emissions credits could be used to create economic value in exceeding recovery requirements and encourage others to implement reduction strategies as the value of credits increases.

Union Pacific Resources Inc. (UPRI) stated that CASA may be the most appropriate forum for addressing sulphur recovery issues because CASA processes would allow a comprehensive review of all acidifying emission sources in the province. It stated that ending grandfathering by a specific date would be the most straightforward approach and would bring closure on the issue in a simple manner. It noted that other alternatives involving limits to remaining plant life or increases in capacity use were administratively burdensome. It said that continued grandfathering would not provide a level playing field and would not address public concerns.

### 3.1.2 Public

A farmer stated that his land was located in close proximity to two large sulphur recovery sour gas plants and that he had not observed any detrimental effects on his health, livestock, or crops for the past 25 years.

A university student said that continued grandfathering would not be the best solution and suggested that plants with increasing throughput or significant remaining life should be required to upgrade.

One landowner said that grandfathered plants should be upgraded and that the sulphur recovery requirements in *IL 88-13* should be made more stringent.

The Environmental Law Centre noted that in its 1983 submission to a review of the sulphur recovery guidelines it recommended that older plants should be phased out or upgraded to meet current standards. It said that the recommendation was still applicable. It stated that consideration of alternatives that required upgrading if sulphur inlet volumes increase by more than 25 per cent should be based on cumulative increases.

The Alberta Surface Rights Federation said that older plants should never have been exempted from the requirements of *IL 88-13*. It stated that measures to reduce sulphur emissions should be implemented now and not in two to four years.

### 3.2 Views of the Advisory Group

Although ambient air quality objectives are being met and provincial acid deposition is well below target loads, the Advisory Group said that because there is potential for localized effects continuous pollution reduction should be pursued on a precautionary basis. Furthermore, it stated that some members of the public believe that sulphur emissions are adversely affecting human and animal health and impacting the environment. The Advisory Group noted that members of the public believed it was not justifiable for grandfathered plants to be allowed to continue emitting more sulphur to the atmosphere than was permitted for newer plants. The Advisory Group stated that this had led to confrontations between industry and community residents that had culminated in EUB hearings. Therefore the Advisory Group believed that decreasing sulphur emissions may reduce the concern of residents living near sour gas plants.

The Advisory Group stated that grandfathering should not be continued indefinitely. It said that a sunset date alone would treat plants with declining throughputs the same as those with sustained throughputs and it believed the situations warranted different approaches. The Advisory Group said that since differentiation on the basis of remaining life would be theoretically correct but practically difficult to apply, it recommended an approach based on limiting increases in sulphur inlet rates with an ultimate sunset date for grandfathered sour gas plant approvals.

The following summarizes the consensus recommendations of the Advisory Group with respect to grandfathered sour gas plant sulphur recovery approvals. In its report, the Advisory Group noted that the recommendations are a package and that the group's consensus was contingent upon all elements being accepted in their entirety.

The Advisory Group recommended that sulphur inlet in excess of 1999 throughput rates should meet *IL 88-13* recovery levels. It further recommended that emissions at each plant should be progressively reduced in the future. It stated that this should result from either a continuous natural decline in plant throughputs or, in the case of sustained sulphur inlet rates, from a requirement that any throughput above a specified decline be required to meet *IL 88-13* sulphur recovery levels. The key points of the Advisory Group's approach to grandfathered sulphur recovery approvals were as follows:

- Plants would not have to upgrade sulphur recovery if sulphur inlet rates declined at a rate of 7.5 per cent per year or more from a baseline based on actual 1999 capacity use. All sulphur inlet in excess of this baseline, declined at 7.5 per cent per year, would be expected to meet the *IL 88-13* sulphur recovery levels, which are summarized in Table 1.

- The exemption limit would start to decline at year zero, the year when policy changes from the subject review are implemented. However, the initial compliance would not be required until after three years, at which point the accumulated decline from the start would be in effect.

- Any grandfathered capacity remaining after 20 years should be terminated.

The Advisory Group's recommended approach to grandfathering is illustrated in Figure 2.

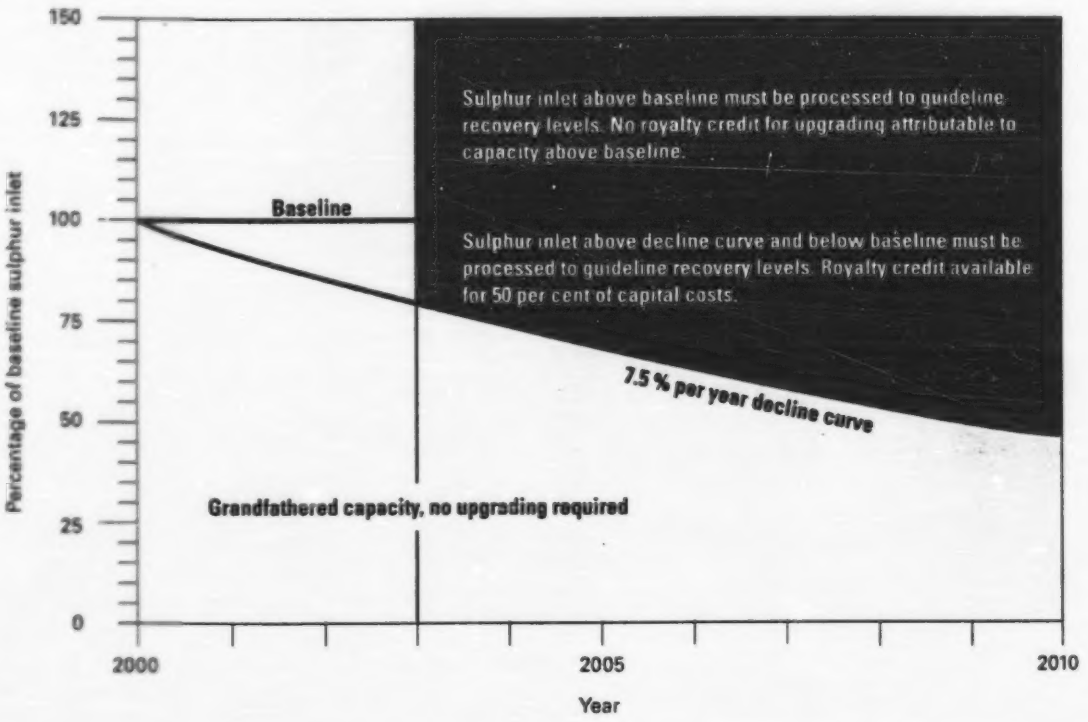
150
125
100
75
50
25
0
Percentage of baseline sulphur inlet
Sulphur inlet above baseline must be processed to guideline recovery levels. No royalty credit for upgrading attributable to capacity above baseline.
Baseline
Sulphur inlet above decline curve and below baseline must be processed to guideline recovery levels. Royalty credit available for 50 per cent of capital costs.
7.5 % per year decline curve
Grandfathered capacity, no upgrading required
2000
2005
2010
Year

**Figure 2. Advisory Group recommendation**

The Advisory Group also recommended that both performance incentives and royalty credits be used to encourage improved sulphur recovery. In the case of royalty credits, it noted that degrandfathering would advance "the public policy objective of pollution prevention and would reduce the risk of localized effects." Therefore, it believed that some degree of public financial support would be justified. The Advisory Group recommended the following incentives:

- Facilities would be given credits for the tonnes of sulphur recovered in excess of the required calendar quarter-year sulphur recovery levels, which could be banked indefinitely. The credits could be used to offset periods of lower-than-required sulphur recovery (e.g., due to upsets or maintenance) to a maximum of 0.5 per cent in any one calendar quarter year. The banked credits would only be able to be used by the facility in which they were earned.

- A Crown royalty credit equivalent to 50 per cent of the capital expended to upgrade sulphur recovery would be made available. The royalty credit would only cover eligible capital costs

of upgrading sulphur recovery capacity to 1999 base-year throughput levels. Grandfathered plants that have already committed to upgrade would be eligible. This program would be limited to upgrades done within 12 years of the implementation date of revised sulphur recovery guidelines.

The Advisory Group also considered emissions trading and area emissions pooling concepts. These concepts would allow plants to meet requirements either by improving sulphur recovery or by obtaining credits from facilities that have exceeded requirements. It noted that emissions trading programs are typically applied on a broader regional scale. However, it said that the focus of degrandfathering is reduction of local effects. Therefore, it stated that any credit trading must occur between plants in close proximity and must result in comparable reductions for local receptors. The Advisory Group said that proposals for local emissions credit trading could be considered on a nonroutine application basis.

## 3.3 Grandfathering: Views of Alberta Environment, Alberta Department of Resource Development, and the Alberta Energy and Utilities Board

### 3.3.1 Decision Criteria

AENV and the EUB, with the participation of DRD, considered the stakeholder submissions, the Advisory Group report, and alternative approaches to dealing with grandfathered sour gas plant sulphur recovery approvals. In order to reach conclusions on the approach to address the grandfathering issue, the following key criteria were defined:

1) It is the view of AENV and the EUB that a desirable outcome of this review would be significant and timely reductions in sulphur emissions from grandfathered sour gas plants.

   AENV expects that industry would take all practical measures to minimize pollutant releases regardless of the actual impact these may have on the receiving environment. This expectation is based on preserving environmental quality in as close to its natural state as possible. This approach helps preserve the environment and also maintains as much assimilative environmental capacity as possible that may be needed in the future for other possible pollutant releases. It is also a precautionary approach to environmental protection, because in many cases the impacts of pollutants on the environment are only partially understood.

2) Any performance credit system should facilitate a reduction in overall emissions relative to the status quo and, as a minimum, must not create a situation where overall sulphur recovery could drop below current levels.

3) The guidelines for addressing grandfathered gas plant approvals must be clear, effective, administratively feasible, efficient, and enforceable.

4) Costs of upgrading grandfathered sour gas plant sulphur recovery levels must be in the public interest, having regard for the effects on gas plant profitability, provincial royalty objectives, and resource recovery relative to effectiveness in addressing environmental and public concerns. In the absence of adverse environmental or public health effects, unreasonable cost

burdens should not be placed on sour gas production projects with minimal remaining productive life.

With respect to costs of sulphur recovery, this report differs from the approach used in the review that culminated in *IL 88-13*. In defining the sulphur recovery guidelines set in *IL 88-13*, economic considerations were based on the capital and operating costs of sulphur recovery in relation to the revenues that could be derived from sulphur sales. Given the relatively high sulphur prices that prevailed in the late 1980s, sulphur recovery was viewed in part as economic in its own right.

Currently, sulphur prices net of transportation from Alberta gas plants to markets or ports are not sufficient to offset the capital and operating costs associated with sulphur recovery. (In some cases, plant gate sulphur prices may even be negative; that is, transportation costs exceed market value.) Sulphur recovery is now a cost of producing, processing, and marketing sour natural gas. This review considered the go-forward impacts of increased capital and operating costs associated with sulphur recovery upgrading at grandfathered gas plants with respect to total plant revenues from the marketing of natural gas and related hydrocarbon liquid and sulphur by-products. The assessment considered the impacts of upgrading grandfathered plant sulphur recovery on operator revenues and on Crown royalty objectives. This approach is a departure from the economic justifications for sulphur recovery that were used in the development of *IL 88-13*.

### 3.3.2 Alternatives Considered for Addressing Grandfathering

AENV, DRD, and the EUB considered four cases in addressing the grandfathered sour gas plant sulphur recovery issue.

***Case 1: Continue Grandfathering***

It was assumed that the grandfathered plant approvals would be continued for the foreseeable future without change. If this were so, grandfathered capacity would likely be restricted to actual throughput in a benchmark time frame (e.g., the maximum quarterly average in the 1998-2000 period). Operators would be required to upgrade the plants if capacity use increased above the benchmark on a quarterly average basis.

***Case 2: Advisory Group Recommendation***

It was assumed that the approach recommended by the Advisory Group would be applied.

***Case 3: End Grandfathering***

It was assumed that all grandfathered approvals would be changed to comply with Table 1 within five years, which was selected as an assumed compliance date for the following reasons.

- It was viewed that a minimum period for upgrading the grandfathered plants would be three years. This would allow one year for industry evaluation of plant consolidation opportunities and budget planning and two years for engineering design, equipment procurement, construction, and start-up.

- It was recognized, however, that the number of potential upgrade projects executed in such a short time frame would likely strain the technical design specialist resources and construction capabilities available to industry; hence a longer period would be advisable.

***Case 4: Phase Out Grandfathering***

This was based on concepts developed by the Advisory Group and modified to enhance both sulphur recovery levels and administrative efficiency. Elements of this alternative include the following concepts.

- A baseline (Baseline Capacity) would be established for each grandfathered plant and would be equal to the highest calendar quarter-year average sulphur inlet over the period January 1, 1998, through September 30, 2000.

- Grandfathered approvals would continue in effect for sour gas plants where sulphur inlet rates were declining at least 7.5 per cent per year. Maximum calendar quarter-year average sulphur inlets for grandfathered sour gas plants would be derived from the following relationship:

  Maximum Grandfathered Capacity in current year = Baseline Capacity x $0.925^{(\text{year } 2000)}$

  The Maximum Grandfathered Capacity is defined as the maximum calendar quarter-year daily average sulphur inlet permitted for facilities that do not meet Table 1 guidelines.

- Grandfathered gas plants operating at calendar quarter-year sulphur inlet rates in excess of the Maximum Grandfathered Capacity would be given until September 30, 2005, to upgrade recovery to comply with Table 1 guidelines on the basis of total average daily sulphur inlet volumes in each calendar quarter year.

- Prior to September 30, 2005, any grandfathered plant proposing to operate at greater than 125 per cent of its baseline in any calendar quarter year would be required to upgrade sulphur recovery in accordance with Table 1.

- After September 30, 2005, remaining grandfathered gas plants would be expected to upgrade sulphur recovery to Table 1 levels prior to increasing calendar quarter-year average sulphur inlet rates above the Maximum Grandfathered Capacity.

The limitations on grandfathering proposed in case 4 are illustrated in Figure 3.

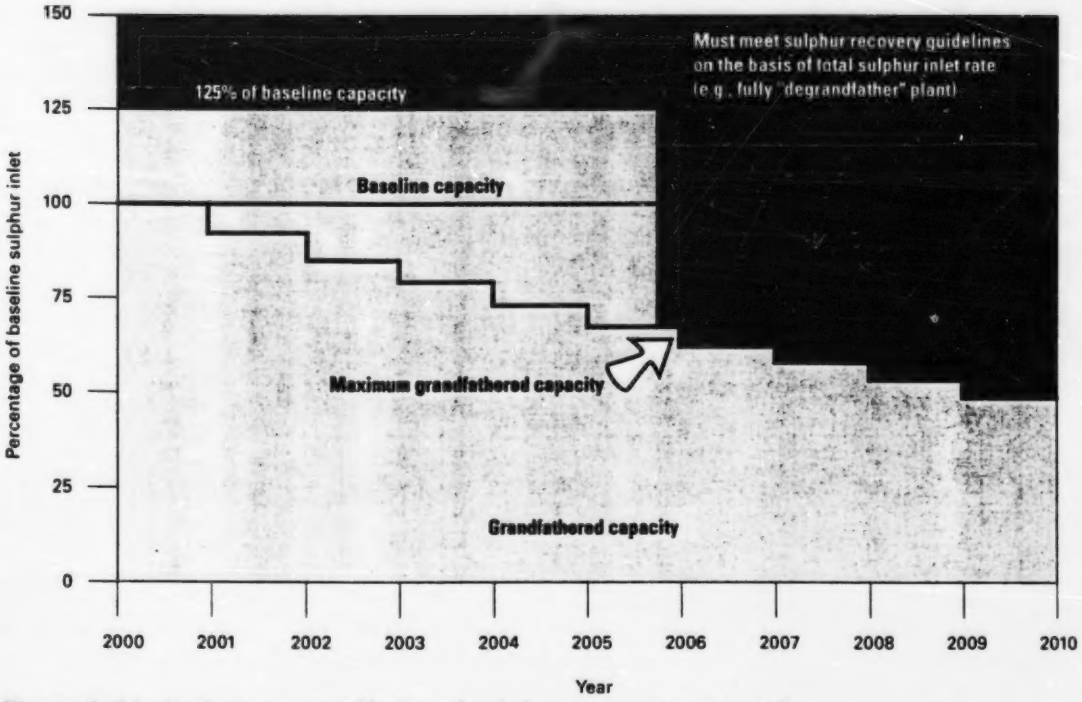


**Figure 3. Limitations on grandfathered sulphur recovery approvals**

### 3.3.3 Evaluation of Alternatives

AENV, DRD, and the EUB independently and jointly reviewed alternative approaches to addressing the grandfathering issue. This included consideration of the potential sour gas plant sulphur emissions reductions for the four cases.

The cases were compared with respect to potential for emissions reductions. A wide range of capacity utilization assumptions are possible. However, two scenarios were considered that may bound the range of likely outcomes.

The sustained throughput scenario assumed sulphur inlet rates would continue at current levels. The declining inlet assumed a 7.5 per cent per year decline in sulphur inlet to all existing sour gas plants. The four alternatives were compared based on these two scenarios, and the following general findings were noted.

- Relative to case 1 (do nothing), case 3 (end grandfathering in five years) was forecast to reduce sulphur emissions by over 400 000 tonnes in a 20-year period.

- The case 3 potential emission reduction over 20 years was forecast to be about 80 000 tonnes if all plant inlet rates declined at 7.5 per cent per year.

- Case 2 (Advisory Group recommendation) was estimated to achieve about half of the reduction of case 3 at constant inlet rates and would have no effect on emissions under the 7.5 per cent per year decline scenario.

- Case 4 would be the equivalent of case 3 for the constant-rate scenario and would have no effect on emissions, relative to case 1, if inlet rates declined at 7.5 per cent per year.

***Case 1: Continue Grandfathering***

a) Benefits

- Consistent with absence of adverse environmental effects related to grandfathered gas plant sulphur emissions.
- Costly upgrading of older gas plants would be avoided.
- Simple to implement.

b) Limitations

- Inconsistent with continuous improvement in pollution prevention and application of best practicable technology.
- Inconsistent with public expectations that older plants with sustained operations be upgraded to meet current pollution prevention and continuous improvement guidelines.

c) Recommendation

AENV and the EUB recommend that continuing the grandfathered approvals would not be appropriate and would be inconsistent with Alberta pollution prevention and continuous improvement principles.

Further, such an approach would be inconsistent with the expectations on remaining plant life inherent in the decision to grandfather existing sulphur recovery approvals in *IL 88-13*. Figure 4 summarizes sulphur inlet capacity use of the larger grandfathered sulphur recovery plants since 1989 and provides a comparison with a 7.5 per cent per year decline curve. Although several plants have been operating at considerably less than rated capacity, AENV and the EUB note that there has been little decline in capacity utilization over the 11-year period. Given recent increasing throughputs in the grandfathered plants and the limited decline in capacity utilization since 1988, AENV and the EUB conclude that the current situation differs considerably from the expectations when *IL 88-13* was issued. It is therefore concluded that guidelines should be revised to support improved sulphur recovery in older sour gas plants.

***Case 2: Advisory Group Recommendation***

a) Benefits

- Reflects consensus recommendation of the Advisory Group.

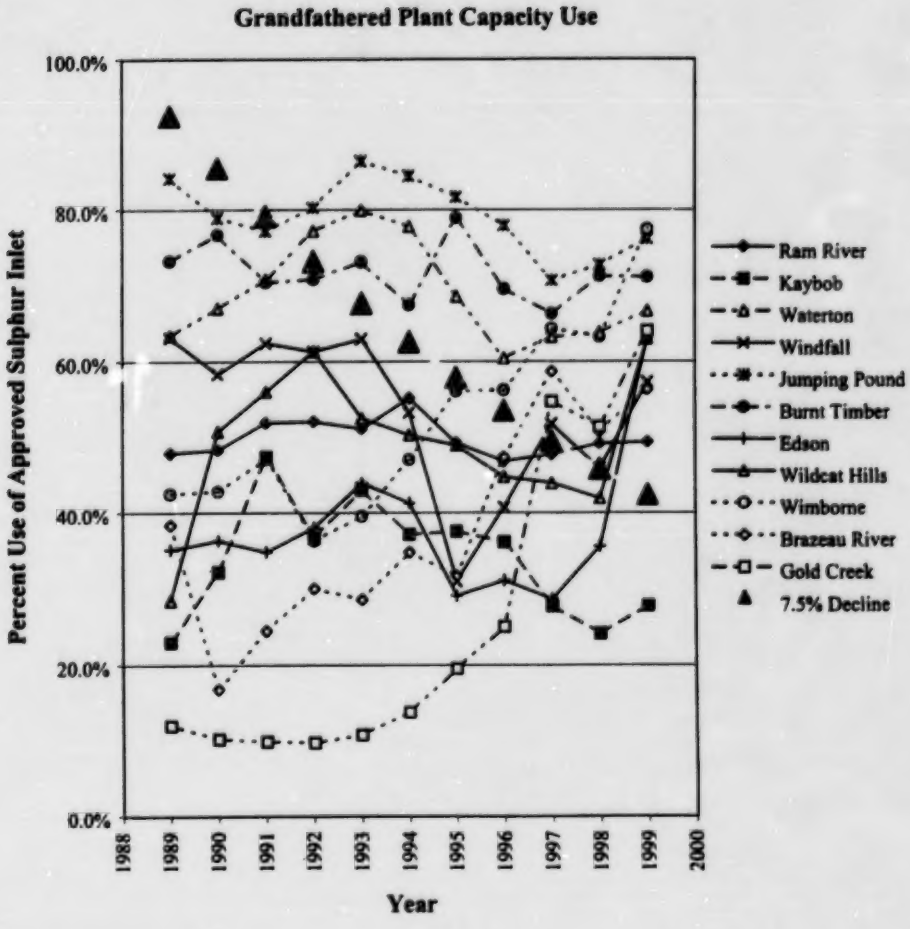


**Figure 4. Historical capacity use at selected grandfathered sour gas plants**

- Does not require costly upgrading of older plants with declining inlet, and reduces upgrading costs by permitting partial upgrading of plants with sustained or increasing throughputs.
- Performance credit system provides a great deal of operational flexibility.

b) Limitations

- Depending on future capacity use, reductions in emissions relative to case 3 are small.
- The timeliness and scale of emissions reductions are less than desirable in terms of Alberta's continuous improvement in pollution prevention policies.
- The partial degrandfathering approach would be complex to administer and enforce.

- The performance credit approach would enable plant operators to operate much closer to actual approvals over time relative to current practices. This could erode current operating margins and result in increased emissions. Further, banking of emission credits simply delays sulphur emissions, as opposed to preventing them.

c) Recommendations

AENV and the EUB recommend that the Advisory Group's proposal that grandfathering be continued for plants with declining sulphur inlet rates be adopted. It that regard, the 7.5 per cent per year decline rate proposed by the Advisory Group is viewed as a reasonable basis and was incorporated into case 4.

The Advisory Group proposal would require that only sulphur inlet in excess of the declining grandfathered capacity curve would have to be processed to Table 1 guidelines. This would result in a blended sulphur recovery requirement for each plant that would change in each quarter based on actual sulphur inlet and on the remaining grandfathered capacity for that period. A complex regulatory licensing, monitoring, and enforcement process would be required to implement this concept. It is recommended, therefore, that the approach to phasing out grandfathering for plants with sustained or increasing throughput should be less complex and more effective (in terms of improved sulphur recovery) than those proposed by the Advisory Group. It is also recommended that plants where sulphur inlet rates exceed the decline criteria should fully, not partially, comply with Table 1 sulphur recovery levels.

AENV and the EUB do recognize, however, that there are likely situations where upgrading is economically and environmentally not justifiable in terms of plant revenues and remaining life. It is believed that the sulphur recovery guidelines should retain the opportunity for operators to apply for situation-specific exceptions to future requirements for upgrading grandfathered gas plants.

As a minimum, AENV and the EUB are of the view that any performance enhancement program should only reward facilities that exceed current recovery guidelines. Additionally, such a program should not allow the use of credits to offset inefficient operations that would otherwise result in enforcement action under current approvals and practices. It is the view of AENV and the EUB that calendar quarter-year sulphur recoveries set out in plant approvals, especially those for the grandfathered plants, represent reasonable minimum pollution prevention expectations. AENV and the EUB therefore recommend that the performance credit program, as proposed, would not be appropriate at this time.

***Case 3: End Grandfathering***

a) Benefits

- Achieves significant and timely reductions in emissions relative to other alternatives.

- Sulphur recovery requirements would be clear, consistent, and administratively straightforward to apply. Little or no change would be required in current monitoring and enforcement programs.

- Addresses concerns of the public, particularly residents near grandfathered plants, that sour gas processing facilities should at least meet the guidelines set out in Table 1.

- Review of plant operations and upgrading opportunities could lead to rationalization of existing sour gas processing capacity. Consolidation of operations could reduce the number of operating sour gas plants, which should reduce public impacts and improve operating economics for the remaining plants.

b) Limitations

- Significant capital and operating costs would be incurred to upgrade sulphur recovery in situations where no apparent adverse environmental effects are occurring.

- Unless a mechanism for consideration of special cases is provided, arbitrary degrandfathering could result in stranding of reserves where the revenue potential of remaining reserves is not sufficient to justify plant upgrading costs.

- Certain grandfathered gas plants could comply with Table 1 by simply relicensing to lower maximum daily sulphur inlet rates. It is recognized that there may be sufficient economic incentive in that regard to reduce sour gas production rates or divert gas to other plants to accommodate the change in approved capacity. In some situations this could result in diverted sour gas being processed in smaller plants at lower sulphur recovery levels (albeit in compliance with Table 1) than if the gas were processed in the grandfathered plant.

c) Recommendations

It is noted that requiring all sour gas plants to comply with Table 1 within a reasonable time frame would be consistent with Alberta pollution prevention and continuous improvement principles and would be the most administratively clear and efficient approach to dealing with the grandfathering issue. While it is recognized that significant costs are involved, these costs may not be exorbitant in terms of facility profitability for plants projected to have sustained or increasing capacity utilization for many years.

AENV and the EUB considered prioritizing upgrading those plants that would have the greatest effect on sulphur emissions. However, it was viewed that any approach to phasing in this manner would be arbitrary, with increased administrative complexity, and would not necessarily be beneficial to industry. It was viewed that extending the degrandfathering implementation period to five years would allow industry to best determine how to phase its approach.

The key limitation of case 3, however, relates to the wisdom of requiring costly upgrades or risking stranding reserves (e.g., remaining reserves and productivity are not sufficient to economically justify sulphur recovery upgrades) in situations of low and declining sour gas supply situations. In such situations, emissions would be declining in parallel with declines in raw gas deliveries to the plant, which would, in part, reduce potential emissions effects on

local areas. AENV and the EUB therefore recommend that ending grandfathering of all plants in the near term, regardless of capacity utilization, is not appropriate.

***Case 4: Phase Out Grandfathering***

a) Benefits

- Where grandfathered gas plants operate at sustained or increasing sulphur inlet levels, achieves significant and timely reductions in emissions.
- Sulphur recovery requirements would be clearer and relatively straightforward to apply.
- Addresses concerns of the public, particularly residents near grandfathered plants, that sour gas processing facilities should at least meet the guidelines set out in Table 1 if the plants sustain or increase throughputs.
- Avoids costly upgrade of grandfathered sour gas plants serving areas of significant productivity declines.

b) Limitations

- Current monitoring and enforcement programs for grandfathered sour gas plants would have to be expanded, relative to case 3, to compare quarterly sulphur inlet with the annual Maximum Grandfathered Capacity to verify compliance with upgrading requirements.
- Depending on annual productivity declines from plant supply areas, grandfathered approvals could continue for some time. Relative to Case 3, this may not address the concerns of local stakeholders near sour gas plants with continuing grandfathered sulphur recovery approvals.

c) Recommendations

AENV and the EUB recommend that it would be reasonable to require upgrading of grandfathered sour gas plants that sustain or increase throughput levels. In many cases, upgrading costs for grandfathered plants that continue to sustain or augment raw gas supplies would be offset by revenues generated by the sustained operations.

It is recognized that emissions reductions achieved by upgrading sour gas plants facing significant declines in supply deliverability may not be significant. Further, declining processing rates will have the effect of reducing overall emissions, even if sulphur recovery levels are not increased. In such situations imposition of significant costs to upgrade sulphur recovery may make continued operation uneconomic and result in the stranding of remaining sour gas reserves (although is it anticipated that proximity of sour gas gathering infrastructure likely presents opportunities for plant consolidation in many cases). Where adverse environmental effects are not demonstrated, stranding of remaining reserves in this manner represents an undesirable loss of resource benefit for both industry and the public. It is therefore recommended that in situations where there is

no evidence of adverse environmental effects, grandfathered plants with declining gas supplies should not necessarily be required to upgrade sulphur recovery.

AENV, DRD, and the EUB believe that case 4 represents the most appropriate alternative in terms of combining an effective approach for dealing with grandfathered sour gas plant sulphur recovery approvals. The approach can be made administratively clear and efficient, it addresses public concerns regarding sustained operations at such facilities, and it recognizes the prudence of not jeopardizing resource revenues from declining operations.

### 3.4 Expanded Sulphur Emissions Control Assistance Program: Views of Alberta Department of Resource Development

DRD conducted gas plant discounted cash flow analysis using go-forward incremental costs plus base costs spread over ten years of total gas plant revenues. DRD concluded the following:

- Sulphur recovery plants are very profitable due to high volumes and low unit operating costs. DRD found that the incremental sulphur extraction costs have a minimal effect on profitability, as the incremental costs are spread across very large volumes.

- Acid gas flaring plants are very profitable in the gas flaring mode. DRD found that the cost of acid gas injection facilities does not significantly affect the profitability of the larger flaring plants. However, smaller plants may be only marginally economic under the acid gas injection scenario.

The share of additional costs accounted for by reducing Crown royalty for gathering, compression, and processing is the appropriate total cost to be borne by the Crown for plants that do not now quality for SECAP.

DRD does not have plans to expand SECAP. DRD is currently reviewing SECAP as part of its schedule of regulatory review and expects to complete the review in the first half of 2001.

### 3.5 Regulatory Flexibility: Views of Alberta Environment, Alberta Department of Resource Development, and the Alberta Energy and Utilities Board

Concern was raised in several submissions and in discussions with stakeholders that there should be some regulatory flexibility in how the guidelines are applied. In particular, there may be circumstances where

- it is not feasible to meet Table 1 requirements due to technical limitations and very high costs, or

- it may be economically beneficial for two or more facilities to cooperate to meet the intent of the guidelines overall, while not individually.

It is recommended that some regulatory flexibility should be considered, as outlined in the following sections.

### 3.5.1 Sulphur Recovery Guideline Exceptions

It is recognized that there may be unique situations where relaxation of the guidelines listed in Table 1 would be appropriate. If an operator believes a variance from the minimum recovery levels is warranted, a nonroutine EUB *Guide 56* process could be used to assess special-case applications on the basis of the following criteria:

- Theoretical recovery capabilities (e.g., on the basis of Claus reaction equilibrium) are less than guideline values due to low acid gas $H_2S$ content, having regard for the feasibility of implementing selective sweetening and/or acid gas enrichment processes.

- Acid gas injection is not technically or economically feasible due to lack of a suitable reservoir within a reasonable distance.

- Upgrading or tie-in costs to other plants are not economically justified in terms of potential revenues from remaining reserves. In such cases, applicants would have to document expected remaining plant life and the economic evaluation of alternatives. It is viewed that any related approvals should have a limited duration (e.g., five years).

While the foregoing is presented in the context of grandfathered gas plants, the consideration with respect to theoretical sulphur recovery capability may also apply to new sour gas facilities, and, therefore, it is not intended to limit the foregoing to grandfathered gas plants.

### 3.5.2 Local Area Emissions Offset Arrangements

AENV and the EUB note recommendations made with respect to increased regulatory flexibility in dealing with sulphur recovery in situations where environmental protection is being achieved. Consideration was given to the potential of a credit trading approach to achieving degrandfathering (e.g., plants exceeding Table 1 sulphur recovery levels could generate and sell credits to grandfathered plants). AENV and the EUB accept the Advisory Group position that such an approach would not address the concerns of residents living near the grandfathered gas plants that choose to purchase credits rather than upgrade sulphur recovery. Consequently, a credit trading alternative was not pursued further.

The Advisory Group and earlier the CASA Enhanced Performance Subgroup have suggested that regulatory agencies should consider applications involving two or more facilities where combined sulphur recovery/emissions reduction performance meet guideline requirements. In such situations, it may be more economic to upgrade one of the facilities to exceed sulphur recovery requirements in a way that offsets lesser performance at a facility less economic to upgrade. The Advisory Group suggested that such an option would only be acceptable if net effects (e.g., predicted ambient air $SO_2$ concentrations, acid deposition) on local receptors were similar to the case where all facilities met the recovery guidelines.

It is recommended that AENV and the EUB entertain nonroutine applications for local sulphur recovery offsets on the basis of the following criteria.

1) Overall sulphur recovery should be at least equivalent to the situation that would exist if all facilities involved individually met the calendar quarter-year sulphur recovery levels in

Table 1. Each facility involved in the offset approval would be required to document and verify compliance with this requirement each calendar quarter year in a summary report to AENV and the EUB or as set out in related approvals.

2) The offset arrangement should only involve facilities within a reasonable local airshed.

3) Related regulatory applications would have to demonstrate, using methodologies acceptable to AENV, that predicted ambient air $SO_2$ concentrations and acid deposition for receptors (especially residents) in the area of the facilities involved would be not greater under the offset arrangement than that predicted for the case if all facilities individually met the guidelines in Table 1.

4) The public would have to be consulted in the vicinity of each of the facilities proposed for inclusion in the offset arrangement. Consultation information would have to include an explanation of the offset program and must explain the alternative involving individual upgrading of facilities to achieve compliance with guidelines. EUB *Guide 56* notification distances appropriate to the classification of each facility should be used. The application would have to provide information on any objections to the proposed offset program.

Because the foregoing may be applicable to new facilities, it is recommended that the offset concept not be limited to grandfathered sour gas plants.

# 4 APPLICATION OF GUIDELINES TO FACILITY TYPES OTHER THAN GAS PLANTS

Heavy oil upgraders, oil refineries, and other industrial operations generate sour gas and acid gas streams, but *IL 88-13* has not been formally applied to such facilities. However, *IL 88-13* has become a benchmark used to set sulphur recovery requirements in upgrader and refinery approvals. It was, therefore, an objective of the review to clarify how the guidelines should apply to these facilities.

Upgraders and refineries also produce coke residue, which contains sulphur. The coke is used as fuel, and when burned, flue gas stack emissions may contain significant quantities of $SO_2$. Similarly, sulphur contained in coal used for power generation in Alberta is emitted from flue gas stacks as $SO_2$. The technologies assessed in the development of *IL 88-13* are not applicable for removal of $SO_2$ from flue gas streams (flue gas desulphurization, or FGD). *IL 88-13*, therefore, does not apply to $SO_2$ emissions from flue stacks, and FGD requirements were not part of this review.

## 4.1 Stakeholder Views

CAPP said that due to operational complexities, heavy oil operations should be treated in a similar manner as refineries and heavy oil upgraders.

The Canadian Petroleum Products Institute (CPPI) said that it encouraged development of specific, separate sulphur recovery guidelines that take into account the complexities of industrial facilities and the downstream petroleum industry. It said sulphur recovery should be

based on the performance of recovery units and should exclude emissions related to sour fuel use and flaring of sour or acid gases. The CPPI stated that grandfathering and allowances for start-up and maintenance should be negotiated on a facility-by-facility basis.

Petro-Canada recommended that refineries and power generation situations should be covered in a separate, specific guideline.

Shell stated that sulphur recovery requirements for commercial-scale heavy oil facilities should be treated in a similar fashion as other industrial facilities. It said that upgraders and refineries are more complex in terms of design, operation, maintenance, and products than batteries and pipeline stations and require more integration of process units. These factors warrant case-by-case consideration of sulphur recovery requirements for downstream plants that consider the complexities of the operations. Shell stated that grandfathering may not necessarily be applicable to existing facilities in this category. It said that issues related to retrofitting to *IL 88-13* standards are complex and different for each type of facility and should be assessed on an individual basis.

Syncrude stated that development of a set of guidelines for other facilities similar to those that exist for sour gas plants, as outlined in *IL 88-13*, would be appropriate. It said that the guidelines would need to recognize facility operational and maintenance complexities, particularly the effect of maintenance activities on sulphur recovery performance.

## 4.2 Views of the Advisory Group

### 4.2.1 Industrial and Downstream Petroleum Facilities

The Advisory Group recommended that the sulphur recovery guidelines should apply only to acid gas streams from amine units and sour water stripper units that typically contain high concentrations of $H_2S$. It said that sulphur in flared sour or acid gas downstream of amine and sour water stripper units should be accounted for in recovery calculations but that sulphur emissions resulting from combustion of sour fuel gas should be excluded. It said that the sulphur recovery guidelines in *IL 88-13* should be applied on a calendar quarter-year basis. This would incorporate the 0.3 per cent reduction from the recovery values shown in Figure 3 of *ERCB-AE 88-AA: Sulphur Recovery Guidelines for Sour Gas Plants in Alberta.*

The Advisory Group stated that sulphur recovery requirements from flue gas sources fired with coal or coke, such as thermal electrical generating plants and upgrader/refinery boilers, should be developed separately.

The Advisory Group said that an allowance should be provided for upgraders and refineries to accommodate continued production during maintenance periods for sulphur recovery process equipment. The Advisory Group recommended that the guidelines for upgraders and refineries include a bankable allowance, which would permit sulphur recovery levels lower than plant approval requirements in a calendar quarter year where planned maintenance occurred. It was proposed that the maximum allowable reduction would be 0.75 per cent below approved plant sulphur recovery requirement in any one quarter. The allowance, earned at 0.15 per cent per year, could be banked to a maximum of 0.75 per cent.

The Advisory Group recommended that an incentive for performing better than plant sulphur recovery approval be implemented. It suggested that credits for the tonnes of sulphur recovered in excess of calendar quarter-year approval requirements be issued. The credits would be used by operators to offset emissions in calendar quarter-year periods where recovery levels would otherwise be below approval requirements. The use of these credits would be limited to offsetting lower than approved sulphur recovery to a maximum of 0.5 per cent in any one quarter. The Advisory Group recommended that the credits could be banked indefinitely.

### 4.2.2 Other Upstream Petroleum Facilities

The Advisory Group supported the application of *IL 88-13* to all other upstream oil and gas facility types, including oil and gas batteries, pipeline compressor stations, and gas dehydration facilities.

## 4.3 Views of Alberta Environment and the Alberta Energy and Utilities Board

### 4.3.1 Industrial and Downstream Petroleum Facilities

AENV and the EUB believe that the technology required to treat and recover sulphur from sour and acid gas streams generated by upgrading and refining processes is similar to that required for sour gas processing. Consequently it is recommended that the sulphur recovery requirements listed in Table 1 should apply to downstream petroleum processing facilities. AENV and the EUB agree that the basis for sulphur recovery determinations would be acid and sour water stripper gas produced inclusive of any flaring of the streams. AENV and the EUB further agree with the Advisory Group recommendations that sulphur recovery requirements be set, monitored, and enforced on a calendar quarter-year basis. That would include the 0.3 per cent reduction in recovery values listed in Table 1 for operational fluctuations.

Sulphur contained in product streams and $SO_2$ flue gases from coke-fired upgrader and refinery boilers would not be included in the recovery basis. AENV and the EUB recognize that the guidelines defined in *IL 88-13* are based on the capabilities of processes designed for treating sour gas and recovering sulphur from resulting acid gas streams. It would not be appropriate to apply the *IL 88-13* guidelines to $SO_2$ in flue gas streams from upgrader or refinery boilers, as fundamentally different technology would be involved.

AENV and the EUB recognize that refineries and upgraders are complex, highly integrated processes. From both economic and environmental standpoints, it is not as feasible to shut down such facilities for sulphur recovery unit maintenance as it is to shut down sour gas plants. It is therefore recommended that some level of flexibility in enforcing approved facility sulphur recovery levels would be appropriate to accommodate partial outages of emission control systems for maintenance. It is viewed that any system for accommodating partial sulphur recovery system outage would need to incorporate the following principles:

- Emissions should not result in a predicted exceedance of Alberta Ambient Air Quality Guidelines and must not result in actual exceedances.

- Emission rates must not exceed maximum values set in Alberta Environmental Protection and Enhancement Act approvals.

- The system should have a reasonable limit on the frequency of periods that do not meet plant approval sulphur recovery requirements.

- Higher sulphur recovery performance should occur at all times outside maintenance periods.

Depending on the sulphur content of refinery or upgrader acid gas streams, emission control processes typically use include a primary sulphur recovery unit (SRU) with a tail-gas cleanup unit (TGCU). TGCUs are usually required to achieve higher recoveries required for sulphur processing rates greater than 50 tonnes/day. AENV recommends that allowance for partial maintenance outages of refinery or upgrader SRU or TGCU processes should be accommodated on the following basis in its approvals:

- SRU processes should incorporate redundant equipment to accommodate partial outages while continuing to process acid gas produced.

- $SO_2$ emission limits in AENV approvals should be set both on the basis of combined operation of the SRU and the TGCU and on the basis of the SRU with the TGCU bypassed or otherwise out of service.

- The amount of time that the TGCU could be bypassed would be set on a facility-specific basis as part of the AENV approval process.

- Higher sulphur recovery levels would be achieved by using longer-term rolling averages (e.g., 90 or 365 day) on all $SO_2$ emission sources. The averages would be based on the sulphur recovery expected when both the SRU and TGCU are operational.

- Operators would be expected to maintain records of sulphur balances, calendar quarter-year sulphur recovery, and the amount of time the TGCU is bypassed. In the event that approved emission limits or TGCU bypass hours are exceeded in any period, operators would be required to submit a report giving reasons for the exceedances and explanation of measures to be taken to prevent recurrence.

- Failing to meet emission limits or exceeding total TGCU bypass hours would be subject to normal AENV and/or EUB enforcement practices.

In the case where the EUB specifies sulphur recovery from acid gas streams in its approvals, it is recommended that the following guidelines be applied to address periodic partial maintenance outages of sulphur recovery processes:

- For periods when sulphur recovery is below the approved value, an allowance of up to 0.75 per cent should be available in any one calendar quarter year.

- The sum of allowances used in a rolling five-year period should not exceed 0.0375 times the number of calendar quarter-year periods when sulphur recovery has met or exceeded approval requirements.

AENV and the EUB considered the recommendation for performance credits based on banking of emissions reductions in excess of emissions levels consistent with approved sulphur recovery. It is viewed that the 0.3 per cent reduction incorporated into quarterly sulphur recovery requirements and the maintenance credit system discussed in the foregoing are sufficient to provide operators with reasonable operating flexibility. However commendable a performance credit system might be, it is viewed that an acceptable operating variance would be incorporated into the 0.3 per cent reduction applied with quarterly sulphur recoveries. AENV and the EUB further view the performance credit system as inappropriate at this time for the following reasons:

- A reporting and audit system would need to be established to record and track disposition of performance credits, and that system would need to be incorporated into regulatory sulphur recovery monitoring and enforcement processes.

- Current sulphur recovery facilities are designed, operated, and maintained to ensure compliance with sulphur recovery approvals. That necessarily means that recoveries would generally exceed approval requirements by some margin to avoid noncompliance. The performance credit system would allow operating and, particularly, maintenance strategies to be targeted at just meeting approval requirements over the long term, with potential that current operating margins could be reduced and net sulphur emissions increased.

### 4.3.2 Other Upstream Petroleum Facilities

EUB *Guide 60: Upstream Petroleum Industry Flaring Guide* extended the sulphur recovery guidelines to flared or incinerated sour gas streams containing more than 1 tonne/day sulphur originating from gas gathering facilities, production batteries, and other non-sour gas plant upstream facilities (*Guide 60*, Section 9.2). As part of this review, AENV and the EUB provided opportunity for discussion of the *Guide 60* requirements for sulphur recovery in non-gas plant upstream facilities.

AENV and the EUB view that application of the sulphur recovery requirements of *Guide 60*, Section 9, is appropriate where routinely flared or incinerated gas streams contain more than 1 tonne/day of sulphur. Recovery requirements should be based on the flared gas stream sulphur content, not on the raw gas sulphur inlet, particularly where large volumes of sour gas are routed through field compression or dehydration facilities. In such situations it is preferable that sour waste gases (e.g., sour water or sour condensate flash gas streams) be recovered and recombined with the facility discharge gas stream.

## 5 PROLIFERATION GUIDELINES

The sulphur recovery requirements in Table 1 are more stringent and generally result in more costly sulphur recovery equipment for plants handling larger amounts of sulphur than for plants handling less sulphur. This means that an owner of new gas can potentially face an economic disincentive with respect to possible expansion of an existing plant in the area. However, use of existing sour gas processing facilities, even if modification or expansion is needed, can result in lower net sulphur emissions and less surface impact in the area than would be the case if additional production, pipeline, and processing infrastructure were installed. Therefore the EUB

and AENV generally encourage use of existing sour gas facilities, in preference to construction of new plants, where it is economically and environmentally prudent to do so.

### 5.1 Stakeholder Views(now Burlington Resources)

CAPP said that the structure of *IL 88-13* encourages the construction of new sour gas facilities to avoid the substantial cost of upgrading existing plants. It said that any future management strategy must encourage rationalization of existing capacity, as well as consolidation of smaller facilities.

GMS stated that proliferation should not only refer to plants, but also pipeline utilization. GMS also recommended that the industry contact requirement radius in *Guide 56* should be substantially increased. It stated that the radius should include applications for Category D and E sour gas processing facilities (30 km contact radius), Category A and C gas processing plants (20 km contact radius) and pipelines that require conservation and reclamation plans (10 km contact radius).

Poco (now Burlington Resources) stated that it is inappropriate to apply the term "proliferation" to development of new sour gas pipelines and processing facilities, which in many cases result in sulphur recovery or acid gas injection. Poco said that new, modern gas plants have advantages over existing sour gas processing facilities, one being better air quality, and that each development should be reviewed on its own merits.

Penn West Petroleum stated that the existing industry contact requirement should be replaced by a requirement that considers the distance between gas gathering systems. Penn West said that while the distance between existing and potential plants may exceed 10 km, the gathering systems for the old and new gas developments may be much closer to each other. Additionally, Penn West suggested the guidelines should not be based on an arbitrary distance but should factor in anticipated reserves and rates, since these parameters will influence pipelining distance.

Shell said that changes to the existing policies should result in an industry response that discourages proliferation and encourages consolidation. It stated that proliferation is linked to grandfathering and must be considered as a priority in assessing the outcomes of any changes to resolve that issue.

The Environmental Law Centre suggested that cumulative effects are a factor to be taken into consideration in granting approvals and setting approval terms and conditions.

### 5.2 Views of the Advisory Group

The Advisory Group stated that EUB *Informational Letter (IL) 91-1: Application for Approval of Gas Processing Schemes – Policy on Plant Proliferation* correctly identifies the main issues associated with public and industry concerns regarding proliferation of gas processing facilities. Furthermore, the group said that the IL adequately describes many of the actions that should be taken when determining whether new processing capacity is needed in an area. The group put forward the suggestions that a higher level of diligence be expected of both industry and the EUB in application of *IL 91-1* and that the EUB prepare a "decision tree" to provide guidance in decision making by industry and the EUB.

The Advisory Group proposed that new gas processing facilities not be permitted if other facilities already exist within a 15 km radius of the proponent's wells that have sufficient capacity or can be modified or expanded to handle the gas. Exceptions would be made if a proponent of a new facility demonstrated that significant social or environmental net benefits would result from permitting a new facility. The 15 km distance was selected by the group to encourage proponents to think regionally when assessing options for processing gas. The group indicated that a distance greater than 15 km would establish overly onerous assessment requirements for developments.

### 5.3 Views of Alberta Environment and the Alberta Energy and Utilities Board

Under current regulatory requirements, owners of new gas reserves that require processing are required to thoroughly explore with other oil and gas owners in the area all reasonable alternatives to use or modify existing facilities in the region before applying to construct new facilities. To serve as a guide for determining the region that should be studied in detail, it is recommended that the 15 km distance suggested by the Advisory Group be adopted by the EUB and AENV.

The EUB and AENV expect that owners of new gas reserves in partnership with other oil and gas owners in the area will determine not only the present processing needs for the region, but prepare a forecast of future production potential for the area, including inactive wells that may become economic in the near term and therefore may require processing capacity. The EUB and AENV expect that immediately after initial contact is made between owners of new gas reserves and those of existing gas processing capacity, the onus should rest equally on both parties to cooperatively explore all reasonable and expeditious means of including the gas within an existing scheme. In most cases the EUB and AENV expect that such consolidation will result in significant social or environmental net benefits compared to building a new facility. Solutions may occur when the new gas can be processed at existing facilities without any physical expansion at the plant, and hence only pipeline applications are required, or when the parties agree to consolidate and expand at an existing processing location. In the latter case, applications for pipelines and increased processing capacity are required.

On the other hand, the discussions may not prove fruitful (e.g., if after completion of such discussions and studies, the new gas owner finds that it wishes to apply for an approval for new processing facilities). In this case, the EUB and AENV will expect that the applicant will be able to provide detailed documentation of the evaluation of the technical, environmental, economic, and other factors related to the decision to construct new facilities. It is recommended that new processing capacity be permitted if the proponent of the new facility demonstrates that significant social and/or environmental net benefits would result from permitting a new facility or if mediation/arbitration among stakeholders, including the affected public, results in support for the new facility that is otherwise acceptable in terms of potential impacts.

The EUB and AENV agree with the Advisory Group's recommendations requiring a higher level of diligence by industry and the regulators in avoiding proliferation, and to this end they recommend a specific decision process to provide guidance to all parties. The decision process would be used as the basis for regulatory review of supporting documentation in new plant applications to ensure that the gas processing needs for the area and alternatives to new facilities

have been assessed and that the proposed course of action is justified. The decision process is illustrated in Figure 5.

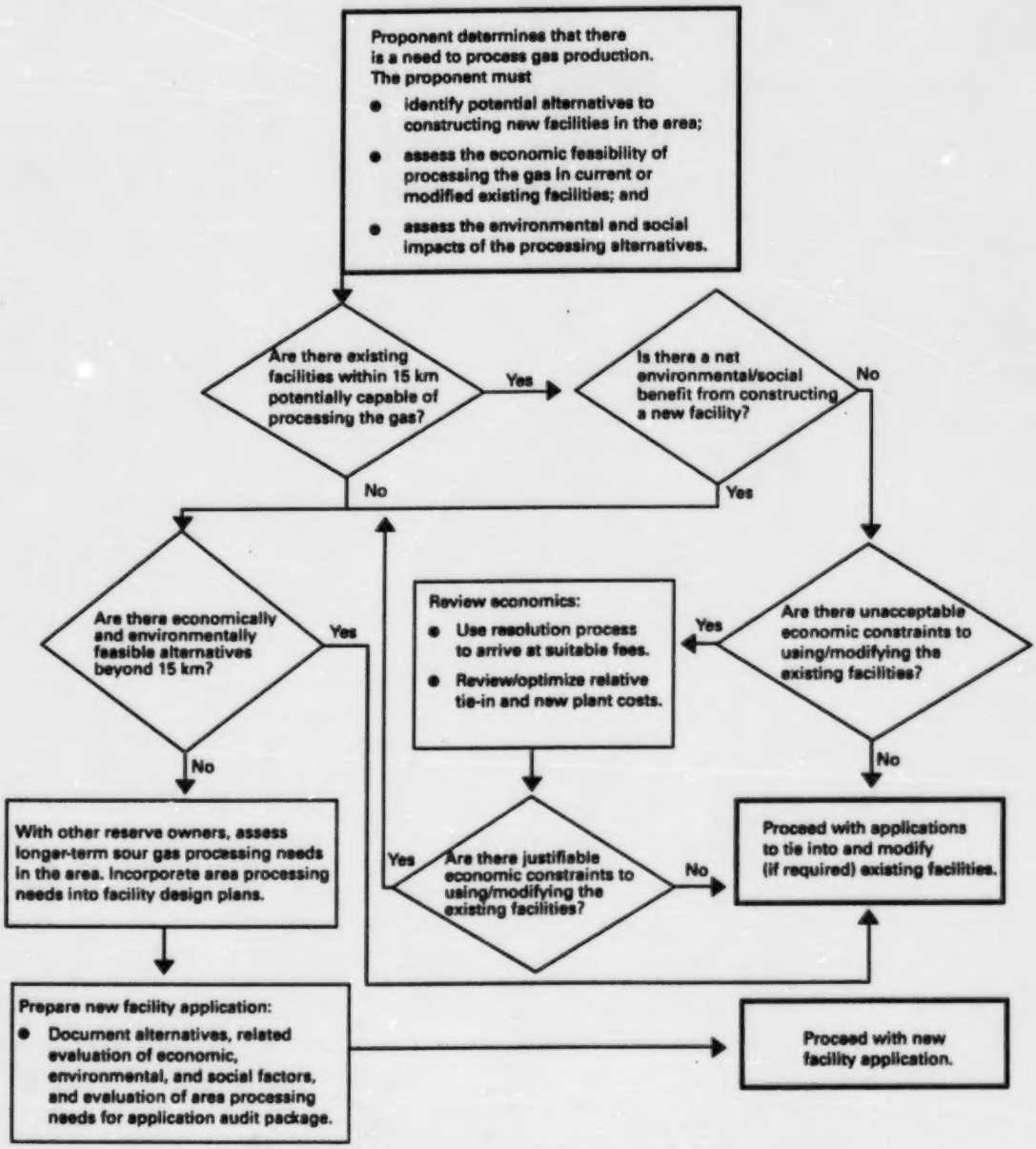
Proponent determines that there is a need to process gas production. The proponent must
identify potential alternatives to constructing new facilities in the area;
assess the economic feasibility of processing the gas in current or modified existing facilities; and
assess the environmental and social impacts of the processing alternatives.
Are there existing facilities within 15 km potentially capable of processing the gas?
Yes
Is there a net environmental/social benefit from constructing a new facility?
No
No
Yes
Are there economically and environmentally feasible alternatives beyond 15 km?
Yes
No
Review economics:
Use resolution process to arrive at suitable fees.
Review/optimize relative tie-in and new plant costs.
Yes
Are there unacceptable economic constraints to using/modifying the existing facilities?
No
With other reserve owners, assess longer-term sour gas processing needs in the area. Incorporate area processing needs into facility design plans.
Yes
Are there justifiable economic constraints to using/modifying the existing facilities?
No
Proceed with applications to tie into and modify (if required) existing facilities.
Prepare new facility application:
Document alternatives, related evaluation of economic, environmental, and social factors, and evaluation of area processing needs for application audit package.
Proceed with new facility application.

**Figure 5. Plant proliferation assessment process**

# 6 REVIEW FINDINGS

## 6.1 Sulphur Recovery Guidelines

The guidelines listed in Table 1 are appropriate for setting sulphur recovery requirements for sour and acid gas processing. The guidelines should apply to sour natural gas plants, flared gas streams at production batteries and pipeline facilities, and sour or acid gas streams in industrial and downstream petroleum industry facilities. The guidelines are not applicable for defining requirements for flue gases generated by the burning of coal or coke that contain $SO_2$.

The guidelines should also apply as a minimum requirement for all facilities using acid gas injection as an alternative to sulphur recovery. Calendar quarter-year recovery should account for sour and acid gas flared by such facilities, and the sulphur contained in acid gas injected will be treated as "recovered." Approvals for acid gas injection systems issued by AENV would typically have more stringent recovery requirements than those in Table 1.

### 6.1.1 Application to Sour Gas Plants

The sulphur recovery guidelines should apply to sour gas processing plants on the basis of the sulphur content of the combined inlet or feed gas to the processing plant. The sulphur content of flared sour and acid gas streams, as well as the sulphur content of recovery process tail gas, should be included in overall plant sulphur recoveries, as summarized in the following relationship:

Sulphur Recovery = Sulphur Production / (Sulphur Production + Sulphur Emissions)

Where:

Sulphur Production = tonnes of sulphur product and/or tonnes sulphur equivalent contained in injected sour or acid gas streams

Sulphur Emissions = tonnes sulphur equivalent contained in flared sour and acid gas streams and in the sulphur recovery process tail gas emissions

Compliance with individual plant sulphur recovery requirements should be monitored and enforced on a calendar quarter-year basis. Appropriate EUB enforcement ladders should be used to address noncompliance with quarterly sulphur recovery requirements, and appropriate AENV enforcement responses would be used when related approval conditions are not met.

### 6.1.2 Application to Other Upstream Petroleum Industry Facilities

The sulphur recovery guidelines should apply in situations where the sulphur content of sour gas continuously flared or incinerated is significant at upstream facilities, such as production batteries, dehydration facilities, and compressor stations (e.g., facilities not classified as sour gas plants and where the bulk gas stream is not sweetened).

Consistent with EUB *Guide 60*, Section 9, the need for and level of sulphur recovery should be based on the sulphur content of flared or incinerated gas streams (e.g., sour water or sour hydrocarbon liquid flash gas). The sulphur content of the bulk sour gas stream handled by the facility should be excluded from sulphur recovery requirement determinations and calculation of quarterly sulphur recoveries.

The sulphur content of any flared gas at such facilities should be included in quarterly sulphur recovery calculations in addition to recovery process tail gas emissions. Sulphur should be deemed as recovered on the basis of

- actual sulphur recovered,
- the sulphur content of injected sour or acid gas streams, and/or
- the sulphur content of sour gas streams recovered and combined with the bulk gas stream.

Compliance with sulphur recovery requirements should be monitored and enforced on a calendar quarter-year basis. Facilities that are not required to submit EUB S-30 statements should be required to maintain sulphur balance records and quarterly recovery calculations. These records must be made available for inspection or audit at the request of EUB staff.

### 6.1.3 Application to Industrial and Downstream Petroleum Industry Facilities

The sulphur recovery guidelines should apply to industrial and downstream petroleum industry facilities (including refineries and heavy oil upgraders) on the basis of the sulphur content of acid gas streams produced from gas sweetening processes. The technologies reviewed in developing the sulphur recovery guidelines are not suited for $SO_2$ contained in flue gas emissions.

Sulphur recovery calculations should include the sulphur content of recovery process tail gas emissions and sulphur emissions attributable to acid gas flaring. Where facilities approvals do not require submission of sulphur balance reports, operators should be required to maintain related information, as well as quarterly recovery calculations. These records must be made available for inspection or audit at the request of AENV or EUB staff.

In recognition of the complexity inherent in industrial and downstream petroleum industry operations, an allowance for infrequent periods of lower recovery to facilitate maintenance activities on sulphur recovery or tail-gas cleanup process equipment would be acceptable, as described in Section 4.3.1.

### 6.1.4 Regulatory Flexibility in Applying Guidelines

**Exception to Sulphur Recovery Guidelines**: An operator that believes a variance from the minimum recovery levels in Table 1 is warranted should consider submitting a nonroutine EUB *Guide 56* application to that effect. The EUB and, if applicable, AENV should consider special-case applications on the basis of the following criteria:

1) Theoretical recovery capabilities are less than guideline values due to low acid gas $H_2S$ content, having regard for the feasibility of implementing selective sweetening and/or acid gas enrichment processes.

2) Acid gas injection is not technically or economically feasible due to lack of suitable reservoir within a reasonable distance.

3) Upgrading or tie-in costs to other plants are not economically justified in terms of potential revenues from remaining reserves. In such cases, the applicant must document expected remaining plant life and the economic evaluation of alternatives.

Any EUB approvals involving exceptions to the sulphur recovery guidelines, including the revised requirements for grandfathered gas plants, should be limited to five years, with potential for renewal upon application. Renewal applications should be expected to be submitted as nonroutine EUB *Guide 56* facilities application.

**Local Area Emissions Offset Arrangements:** AENV and the EUB recognize that in some situations it may be appropriate to regulate overall sulphur recovery from a grouping of facilities within a local area instead of requiring each individual facility to meet the sulphur recovery guidelines. AENV and the EUB should consider nonroutine applications for local sulphur recovery offsets on a case-by-case basis subject to the following criteria:

1) Overall sulphur recovery must be at least equivalent to the situation that would exist if all facilities involved individually met the calendar quarter-year sulphur recovery levels in Table 1. Calendar quarter-year reports will be required to verify compliance.

2) The offset arrangement may only involve facilities within a reasonable local airshed. The application must demonstrate, using methodologies acceptable to AENV, that predicted ambient air $SO_2$ concentrations and acid deposition predicted for receptors (especially residents) in the area of the facilities involved would be not greater under the offset arrangement than that predicted for the case if all facilities individually met the guidelines in Table 1.

3) The public must be consulted in the vicinity of each of the facilities proposed for inclusion in the offset arrangement. Consultation information must include an explanation of the offset program and must explain the alternative involving individual upgrading of facilities to achieve compliance with guidelines. EUB *Guide 56* notification distances appropriate to the classification of each facility must be used. The application must provide information on any objections to the proposed offset program.

## 6.2 Grandfathered Sulphur Recovery Approvals

### 6.2.1 Grandfathered Sour Gas Plants

Sour gas plants with approved sulphur recoveries less than the calendar quarter-year values given in Table 1 (grandfathered approvals) and continuing to operate at sustained rates should be expected to meet Table 1 guidelines commencing September 30, 2005.

Sour gas plants with grandfathered sulphur recovery approvals operating in declining gas supply situations should be permitted to continue operations without upgrading sulphur recovery provided that the following criteria are met:

1) Grandfathered approvals would continue in effect provided that sulphur inlet rates are declining at least 7.5 per cent per year according to the following relationship:

   Maximum Grandfathered Capacity in current year = Baseline Capacity x $0.925^{(\text{year } 2000)}$

   The Maximum Grandfathered Capacity is defined as the maximum calendar quarter-year daily average sulphur inlet permitted for facilities that do not meet Table 1 guidelines.

   The Baseline Capacity is defined as the highest calendar quarter-year average daily sulphur inlet over the period January 1, 1998, through September 30, 2000.

2) Grandfathered gas plants operating at calendar quarter-year sulphur inlet rates in excess of the Maximum Grandfathered Capacity would be given five years (until September 30, 2005) to upgrade recovery to comply with Table 1 guidelines.

3) Prior to September 30, 2005, any grandfathered plant proposing to operate at greater than 125 per cent of its baseline in any calendar quarter year would be required to upgrade sulphur recovery in accordance with Table 1.

4) After September 30, 2005, remaining grandfathered gas plants should be required to upgrade sulphur recovery to Table 1 levels prior to increasing calendar quarter-year average sulphur inlet rates above the maximum grandfathered capacity.

The limitations on grandfathered sulphur recovery are illustrated in Figure 3.

Within the limitations of legislation, it is believed that both AENV and EUB regulatory approval processes should be streamlined for operators planning to relicense or upgrade grandfathered gas plants. In that regard a notification process should be put in place for operators electing to relicense grandfathered plants prior to 2005. In situations when the directly affected public may have relevant concerns or objections (e.g., sour gas pipelines associated with acid gas injection schemes), it is recognized that appropriate application and approvals processes should not be waived.

While the Advisory Group recommended that all grandfathering be ended at the end of 20 years, this report makes no specific finding on an end date. It is noted that in 20 years the Maximum Grandfathered Capacity would only be 21per cent of the baseline. This suggests that most plants will have either upgraded by this time or would be approaching a shutdown point. It is also believed that it would be inappropriate to commit to allowing the practice that far into the future as technology, understanding of air quality issues, and public policy on pollution control may well change within that time.

### 6.2.2 Other Upstream Petroleum Industry Facilities

Upstream petroleum industry facilities other than sour gas processing plants approved prior to January 1, 2000 (the effective date of EUB *Guide 60*) should be required to comply with the sulphur recovery guidelines on the same basis and time frame as established for grandfathered sour gas plants in Section 6.2.1.

### 6.2.3 Industrial and Downstream Petroleum Industry Facilities

With the issue of recent approvals and completion of related construction, heavy oil upgraders in Alberta will effectively comply with the sulphur recovery guidelines, and grandfathering is not an issue.

Requirements for upgrading sulphur recovery to comply with the guidelines at other industrial and refining facilities will be determined on a case-by-case review basis with AENV. It is expected that related requirements and time frames will be consistent with those for grandfathered sour gas plants unless otherwise specified in the facility operating approval.

### 6.2.4 Sulphur Emission Control Royalty Credits

Analysis by DRD found that economic sustainability of grandfathered sour gas plants would generally not be threatened by costs of upgrades.

DRD does not have plans to expand SECAP. DRD is currently reviewing SECAP as part of its schedule of regulatory review and expects to complete the review in the first half of 2001.

## 6.3 Sour Gas Plant Proliferation

Prior to applying for approval to construct a new sour gas processing facility, the proponent should be required to complete a thorough evaluation of alternatives to process the gas in existing facilities. In that regard, operators should demonstrate that all existing facilities in the area that afford technically viable alternatives, regardless of ownership or interest, have been identified and assessed. As a minimum, proponents should be required to clearly demonstrate to the EUB that any proposed new sour gas plant within 15 km of an existing sour gas processing facility is justified in terms of net social and environmental effects. Proponents should be required to consult and involve local residents in their process for evaluation of alternatives. To preclude the unnecessary development of new facilities, applicants should be required to evaluate the feasibility of upgrading existing facilities and/or forging commercial partnerships with existing operators.

Proponents should be required to pursue alternatives that maximize sulphur recovery and minimize environmental impacts. In evaluating the environmental and social effects of alternatives, proponents should assess and compare the following as a minimum:

- surface disturbance impacts of a new plant project with potential impacts of incremental pipelines and other facilities required to use existing facilities;
- overall air emissions ($SO_2$, $NO_x$, $CO_2$) of alternatives; and

- public proximity to alternative facilities and related public risk concerns.

It is the objective of the process to identify the technically and economically feasible alternative that minimizes adverse impacts. It is recognized that there will be circumstances where construction of new sour gas processing facilities will be more acceptable from an environmental and public impact standpoint. The EUB, however, should not consider high fees for using existing facilities as an acceptable justification of new sour gas plants if other technically feasible and more environmentally and publicly acceptable alternatives exist. In such situations, the EUB has processes for dispute resolution and EUB legislation provides for the review of facility processing fees.

Proponents should be required to contact other reserve operators in the area, assess longer-term gas processing needs, and account for regional processing needs in the design of proposed new facilities. As a minimum, the area to be assessed should be consistent with industry notification requirements for sour gas plants as described in EUB *Guide 56: Energy Development Application Guide*.

The results of the detailed technical, environmental, social, and economic evaluation of alternatives, including the assessment of area processing needs, should be required to be documented and should be reviewed by the EUB as part of the application process. The material should demonstrate that the proponent has identified and evaluated alternatives according to the process outlined in Figure 5.

## 7 RECOMMENDATION

It is recommended that the findings with respect to application of the sulphur recovery guidelines as described in Section 6 of this report be incorporated into a new sulphur recovery guidelines interim directive (ID) to replace *IL 88-13*. It is proposed that the new ID be jointly issued by Alberta Environment and the Alberta Energy and Utilities Board.

It is recommended that the findings with respect to a sulphur emissions control royalty credit program be addressed independently by Alberta Department of Resource Development.

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## Appendix Implementation Document

### EUB/AENV STAFF RECOMMENDATION FOR SULPHUR RECOVERY GUIDELINES FOR THE PROVINCE OF ALBERTA

The Alberta Energy and Utilities Board (EUB), Alberta Environment (AENV), and Alberta Department of Resource Development have completed a review of the sulphur recovery guidelines for sour gas plants in Alberta.

This document identifies staff recommendations to the EUB and AENV on implementing the findings of the review and applying revised sulphur recovery guidelines to sour gas plants, other upstream petroleum facilities, and downstream petroleum operations, including refineries and heavy oil and bitumen upgraders.

### 1 Sulphur Recovery Guidelines

The sulphur recovery guidelines for new sour gas plants set out in *IL 88-13: Sulphur Recovery Guidelines—Gas Processing Operations* and as described here in Table 1 have been adopted as the basis for sulphur recovery and emissions reduction from

- sour gas processing plants,
- sour gas emissions at other types of upstream petroleum industry operations, and
- acid gas streams produced in downstream petroleum industry facilities, including refineries and heavy oil upgraders.

In this document "acid gas" refers to a gas mixture containing predominantly hydrogen sulphide ($H_2S$) and carbon dioxide ($CO_2$), which results from the treating or "sweetening" of sour gas.

**Table 1. Sulphur recovery guidelines for sour gas plants**

| Sulphur inlet rate (tonnes/day) | Design sulphur recovery criteria[1] (%) | Calendar quarter year sulphur recovery (%) |
|---|---|---|
| 1-5 | 70 | 69.7 |
| > 5-10 | 90 | 89.7 |
| > 10-50 | 96.2 | 95.9 |
| > 50-2000 | 98.5 - 98.8[2] | 98.2 – 98.5[3] |
| > 2000 | 99.8 | 99.5 |

[1] Deduct 0.3 % for quarterly average requirements.
[2] Recovery = 98.18185 + 0.187259 $\log_{10}$(sulphur inlet rate).
[3] Quarterly recovery = 97.88185 + 0.187259 $\log_{10}$(sulphur inlet rate).

Both AENV and the EUB have regulatory responsibilities for many of the facilities covered by the sulphur recovery guidelines. Under its legislation, AENV, where warranted, may set more

stringent $SO_2$ emission limits for specific facilities than those resulting from the EUB's application of the sulphur recovery guidelines. Depending on unique circumstances (see Section 4.1), the EUB may also set specific sulphur recoveries that differ from Table 1 as a result of its facility applications and adjudication processes.

## 2 Application of the Sulphur Recovery Guidelines for New Facilities

### 2.1 Application to Sour Gas Plants

New sour gas processing plants must comply with the calendar quarter-year sulphur recoveries listed in Table 1 unless alternative requirements are set out as the result of a specific facility application review and approval. The sulphur recovery for sour gas processing plants must be determined based on mass (tonnes sulphur equivalent) and calculated on the following basis:

Sulphur Recovery = Sulphur Production / (Sulphur Production + Sulphur Emissions)

Where:

Sulphur Production = tonnes of sulphur product and/or tonnes sulphur equivalent contained in injected sour or acid gas streams

Sulphur Emissions = tonnes sulphur equivalent contained in flared sour and acid gas streams and in the sulphur recovery process tail gas emissions

The EUB will monitor and enforce compliance with individual plant sulphur recovery requirements on a calendar quarter-year basis. For AENV's purposes, sulphur recovery/sulphur inlet rates are used in setting various $SO_2$ emission limits, with enforcement done through normal AENV processes.

### 2.2 Application to Other Upstream Petroleum Industry Facilities

Consistent with Section 9 of EUB *Guide 60: Upstream Petroleum Industry Flaring Guide*, upstream petroleum facilities other than gas plants (e.g., production batteries, dehydration facilities, and compressor stations where the bulk gas stream is not sweetened) that continuously flare or incinerate sour off-gas streams are subject to the sulphur recovery guidelines listed in Table 1. Sulphur recovery requirements for these facilities are to be determined based on the sulphur content of flared or incinerated gas streams.[1] The sulphur inlet content of the sour gas stream handled by the facility will not be used as the basis for determining sulphur recovery requirements and calculating quarterly sulphur recoveries.

[1] For example: A pipeline dehydration facility with an inlet sour gas sulphur content of 100 tonnes/day flares a low-pressure sour water flash gas stream containing 2 tonnes/day. After dehydration the sour gas is pipelined to a gas plant for processing. In this case the sulphur recovery requirements for the dehydrator facility would apply to the 2 tonnes/day flare stream and, on a calendar quarter-year basis, 69.7 per cent of the sulphur in the flare gas stream must be recovered.

The sulphur content of any gas flared or incinerated at such facilities will be included in quarterly sulphur recovery calculations in addition to recovery process tail gas emissions. Sulphur will be deemed as recovered on the basis of

- actual sulphur recovered,
- the sulphur content of injected sour or acid gas streams, and/or
- the sulphur content of sour gas streams recovered and recombined with the bulk gas stream.

Compliance with sulphur recovery requirements will be monitored and enforced on a calendar quarter-year basis. Facilities with sulphur emissions greater than 1 tonne/day that are not required to submit EUB S-30 statements must maintain daily sulphur balance records and quarterly recovery calculations. These records must be made available for inspection or audit at the request of EUB staff.

## 2.3 Application to Industrial and Downstream Petroleum Industry Facilities

The sulphur recovery guidelines listed in Table 1 apply to acid gas stream generated in industrial and downstream petroleum industry facilities (including refineries and heavy oil upgraders), unless alternative requirements are set out for a specific facility as the result of a related application review and approval.

Sulphur recovery will be calculated on the following basis:

Sulphur Recovery = Sulphur Production / (Sulphur Production + Sulphur Emissions)

Where:

Sulphur Production = tonnes of sulphur product recovered from acid gas streams and/or tonnes sulphur equivalent contained in injected sour or acid gas streams

Sulphur Emissions = tonnes sulphur equivalent contained in flared acid gas streams and in the sulphur recovery process tail gas emissions

The sulphur recovery guidelines do not apply to $SO_2$ contained in flue gas emissions from facilities that burn coal or coke as a fuel. Thus, sulphur by-products from flue gas desulphurization (FGD) processes would not typically be accounted for in acid gas sulphur recovery determinations.

In cases where the FGD process is also used to process sulphur recovery process tail gas, FGD sulphur products and emissions should be prorated on the basis of the sulphur content of the tail gas and actual FGD performance.

In recognition of the complexity inherent in industrial and downstream petroleum industry operations, an allowance for infrequent periods of lower recovery to facilitate maintenance activities on sulphur recovery or tail-gas cleanup process equipment may be accepted.

Depending on the sulphur content of refinery or upgrader acid gas streams, emission control processes typically used include a primary sulphur recovery unit (SRU) with a tail-gas cleanup unit (TGCU). TGCUs are usually required to achieve higher recoveries required for sulphur processing rates greater than 50 tonnes/day. AENV approval processes will take into account periodic sulphur emission control equipment outages on the following basis.

- SRU processes must incorporate redundant equipment to accommodate partial outages while continuing to process produced acid gas.

- $SO_2$ emission limits in AENV approvals will be set both on the basis of combined operation of the SRU and the TGCU and on the basis of the SRU with the TGCU bypassed or otherwise out of service.

- The amount of time that the TGCU may be bypassed will be set on a facility-specific basis as part of the AENV approval process.

- Attainment of overall sulphur recovery levels will be achieved by using longer-term rolling averages (e.g., 90 or 365 day) on all $SO_2$ emission sources. The averages will be based on the sulphur recovery expected when both the SRU and TGCU are operational.

In the case where the EUB specifies sulphur recovery from acid gas streams in its approvals, the following guidelines address provisions for periodic partial maintenance outages of sulphur recovery processes.

- For periods where sulphur recovery is below the approved value, an allowance of up to 0.75 per cent may be applied in any one calendar quarter year.

- The sum of allowances used in a rolling five-year period must not exceed 0.0375 times the number of calendar quarter-year periods where sulphur recovery has met or exceeded approval requirements.

Operators must maintain records of sulphur balances, calendar quarter-year sulphur recovery, and the amount of time the TGCU is bypassed. In the event that approved emission limits or TGCU bypass hours are exceeded in any period, operators must submit a report to AENV giving reasons for the exceedances and an explanation of measures to be taken to prevent recurrence.

Failing to meet emission limits or sulphur recovery levels and exceeding total TGCU bypass hours are subject to normal AENV and EUB enforcement practices.

## 3 Application of the Sulphur Recovery Guidelines to Pre-existing, or Grandfathered, Approvals

### 3.1 Grandfathered Sour Gas Plants

As of December 31, 2000, sour gas plants with approved sulphur recoveries less than the calendar quarter-year values given in Table 1 (grandfathered approvals) will be expected to meet Table 1 guidelines commencing September 30, 2005, for the entire sulphur inlet amount, unless plant capacity use meets the criteria for continued grandfathering.

Sour gas plants with grandfathered sulphur recovery approvals operating in declining gas supply situations will be permitted to continue operations without upgrading sulphur recovery on the following basis.

1) Grandfathered approvals may continue in effect provided that sulphur inlet rates are declining at least 7.5 per cent per year according to the following relationship:

   Maximum Grandfathered Capacity in current year = Baseline Capacity x $0.925^{(\text{year } 2000)}$

   The **Maximum Grandfathered Capacity** is defined as the maximum daily average sulphur inlet permitted in any calendar quarter year for facilities that do not meet Table 1 guidelines.

   The **Baseline Capacity** is defined as the highest calendar quarter-year average daily sulphur inlet over the period January 1, 1998, through September 30, 2000.

2) Grandfathered gas plants operating at calendar quarter-year sulphur inlet rates in excess of the Maximum Grandfathered Capacity must upgrade recovery capability for the entire sulphur inlet amount as necessary to comply with the Table 1 guidelines by September 30, 2005.

3) Prior to September 30, 2005, any grandfathered plant proposing to operate at greater than 125 per cent of its baseline must upgrade sulphur recovery in accordance with Table 1 prior to operating at such rates.

   Operators must notify the EUB Applications Branch and AENV specifying the maximum daily raw gas inlet rate, the maximum daily sulphur inlet rate in tonnes/day, and the calendar quarter-year sulphur recovery rate that will appear in the revised plant approval. If the plant is capable of meeting the sulphur recovery guidelines without significant modification, the maximum inlet gas and sulphur inlet rates are not greater than the existing plant approval values, and if the calendar quarter-year sulphur recovery complies with Table 1, the EUB will amend the plant approval accordingly without formal application. With respect to AENV operating approvals, as there is no change in activity or equipment modifications, the $SO_2$ emission limits will be adjusted at the time of approval renewal or at a time and in a manner agreed to after consultation with AENV regional staff.

4) After September 30, 2005, operators of remaining grandfathered gas plants must make an application, receive approval, and upgrade sulphur recovery to Table 1 levels prior to

increasing calendar quarter-year average sulphur inlet rates above the Maximum Grandfathered Capacity.

The limitations on grandfathered sulphur recovery facilities are illustrated in Figure 1.

Prior to January 1, 2005, operators of grandfathered sour gas plants must notify the EUB Applications Branch and AENV in writing of their intentions for the plant.

- If the operator intends to increase sulphur recovery to comply with the sulphur recovery guidelines (to degrandfather), the notification must specify the maximum daily raw gas inlet rate, the maximum daily sulphur inlet rate in tonnes/day, and the calendar quarter-year sulphur recovery rate that will appear in the revised plant approval. Provided that the maximum inlet gas and sulphur rates are not greater than the existing plant approval values and provided that the calendar quarter-year sulphur recovery complies with Table 1, the EUB will amend the plant approval accordingly without formal application. With respect to AENV operating approvals, if there is no change in activity or equipment modification, the $SO_2$ emission limits will be adjusted at the time of approval renewal or at a time and in a manner agreed to after consultation with AENV regional staff.

- If the operator intends to continue the grandfathered status of the plant, notice to that effect must be provided to the EUB and AENV. In the event that operators fail to provide notice, the EUB will assume that the intention is to continue grandfathering. In such cases the EUB will monitor and enforce the annual Maximum Grandfathered Capacity limitation for the plant on a calendar quarter-year basis. AENV will work with the EUB in this regard.

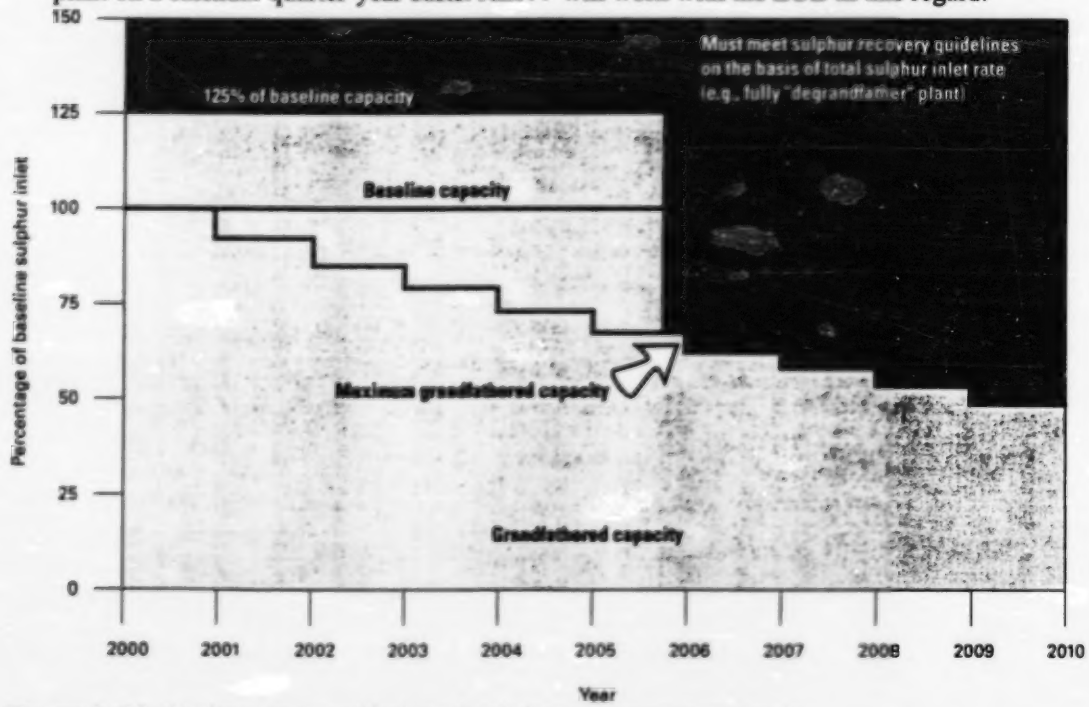


**Figure 1. Limitations on grandfathered sulphur recovery approvals**

In situations where it is proposed to increase approved capacities or install significant new facilities, this document does not waive approval application requirements set out in EUB *Guide 56: Energy Development Application Guide* or EUB *Guide 65: Resources Applications for Conventional Oil and Gas Reservoirs.* (*Guide 65* is relevant for acid gas injection scheme applications.)

EUB applications related to sulphur recovery must be submitted for

- new acid gas injection schemes,
- increases to the maximum daily inlet raw gas or sulphur inlet rates stipulated in existing gas plant approvals,
- significant additions to or modification of plant process systems,
- change in facility category/type (e.g., from D to E or in the case of acid gas injection from E to D),
- addition of compression, including acid gas injection compressors, and
- after January 1, 2005, increases of grandfathered gas plant sulphur inlet rates above the Maximum Grandfathered Capacity.

For approvals issued by AENV, a specific amendment application for sulphur recovery is only required if plant modifications are necessary. The application would be comprehensive in nature (air, water, soil, air dispersion modelling, etc.) and must be in place before construction begins. AENV application processes require public notice and should be discussed with AENV regional approvals staff.

If no physical equipment changes or modifications are required, AENV will adjust approval $SO_2$ emission limits during the regular approval renewal process. Procedures and protocols for approval renewal will follow normal AENV processes or will be adjusted at a time and in a manner agreed to after consultation with AENV regional staff.

### 3.2 Other Upstream Petroleum Industry Facilities

Upstream petroleum industry facilities other than sour gas processing plants approved prior to January 1, 2000 (the effective date of EUB *Guide 60*) must comply with the sulphur recovery guidelines on the same basis and time frame as established for grandfathered sour gas plants in Section 3.1.

### 3.3 Industrial and Downstream Petroleum Industry Facilities

As a result of recent approvals and the completion of related construction, heavy oil upgraders in Alberta will effectively comply with the sulphur recovery guidelines.

Requirements for upgrading sulphur recovery to comply with the guidelines at other industrial and refining facilities have been determined on a sector-specific review basis with AENV. Any facility operator that remains unclear of the application of this document to its operations should consult directly with AENV regional staff. The requirements and time frames for grandfathered sour gas plants (Section 3.1) may be used as the benchmark for assessing sulphur recovery requirements.

## 4 Regulatory Flexibility in Applying Guidelines

### 4.1 Exception to Sulphur Recovery Guidelines

In the case where an upstream oil and gas or oil sands operator believes a variance from the minimum recovery levels in Table 1 is warranted, a nonroutine EUB *Guide 56* facilities application to that effect must be submitted. The EUB and, if applicable, AENV will consider these applications if

1) due to low acid gas $H_2S$ content, the theoretical recovery capabilities (e.g., on the basis of Claus reaction equilibrium) are less than guideline values, having regard for the feasibility of implementing selective sweetening and/or acid gas enrichment processes;

2) acid gas injection is not technically or economically feasible due to lack of a suitable reservoir within a reasonable distance; or

3) sulphur recovery upgrading or tie-in costs to other plants are not economically justified in terms of potential revenues from remaining reserves. In such cases, applicants must document expected remaining plant life and the economic evaluation of alternatives.

Any EUB and, if applicable, AENV approvals involving exceptions to the sulphur recovery guidelines, including the revised requirements for grandfathered gas plants, will be limited to five years, with potential for renewal upon application. Renewal applications must be submitted as nonroutine EUB *Guide 56* facilities applications.

### 4.2 Local Area Emissions Offset Arrangements

AENV and the EUB recognize that in some situations it may be appropriate to regulate overall sulphur recovery from a grouping of facilities within a local area, as opposed to requiring each individual facility to meet the sulphur recovery guidelines. In some situations, it may be more economic to exceed recovery guidelines at one facility in order to offset lower-than-guideline recoveries at another plant. AENV and the EUB will consider nonroutine applications for local sulphur recovery offsets on a case-by-case basis subject to the following criteria:

1) Overall sulphur recovery must be at least equivalent to the situation that would exist if all facilities involved individually met the calendar quarter-year sulphur recovery levels in Table 1. Calendar quarter-year reports will be required to verify compliance.

2) The offset arrangement may only involve facilities within a reasonable local airshed. The application must demonstrate, using methodologies acceptable to AENV, that predicted ambient air $SO_2$ concentrations and acid deposition for receptors (e.g., residential locations) near the participating facilities would not be greater under the offset arrangement than predicted if all facilities individually met the guidelines in Table 1.

3) The public in the vicinity of each of the facilities proposed for inclusion in the offset arrangement must be consulted. The information provided to the public must include an explanation of the offset program and explain the alternative involving individual upgrading of facilities to achieve compliance with guidelines. EUB *Guide 56* notification distances appropriate to the classification of each facility must be used. The application must provide information on any objections to the proposed offset program.

4) If approval is granted for the offset arrangement, the participating facilities will be treated as one entity for EUB enforcement action with respect to compliance with sulphur recovery requirements. The approval will designate one operator responsible for reporting sulphur balances and quarterly sulphur recovery performance for the offset arrangement.

Applications to the EUB Applications Branch for offset arrangements may be made as nonroutine *Guide 56* facilities applications.

## 5 Sour Gas Facility Proliferation

To preclude the unnecessary development of new sour gas processing facilities, proponents must thoroughly evaluate the feasibility of upgrading existing facilities and/or forging commercial partnerships with existing operators prior to applying for approval to construct a new sour gas plant. In particular, proponents must clearly demonstrate to the EUB that any proposed new sour gas plant within 15 km of an existing sour gas processing facility is justified in terms of net social and environmental effects. Proponents must complete a thorough evaluation of alternatives to process the gas in existing facilities, as outlined in Figure 2. In addition, proponents must consult and involve local residents in their process for evaluation of alternatives and identify and assess all existing facilities in the area that afford technically viable alternatives, regardless of ownership or interest.

It is expected that proponents, prior to proposing such a facility, will evaluate the environmental and social effects of alternatives to assess and compare the following as a minimum:

- surface disturbance impacts of a new plant project with potential impacts of incremental pipelines and other facilities required to use existing facilities;
- overall air emissions ($SO_2$, $NO_x$, $CO_2$) of alternatives; and
- public proximity to alternative facilities and related public risk concerns.

Proponents must identify technically and economically feasible alternatives that minimize adverse impacts. It is recognized that there will be circumstances where construction of new sour gas processing facilities will be more acceptable from an environmental and public impact

standpoint. The EUB, however, may not consider high fees for using existing facilities as an acceptable justification of new sour gas plants if other technically feasible and more environmentally and publicly acceptable alternatives exist. In such situations, the EUB has processes for dispute resolution and EUB legislation provides for the review of facility processing fees.

Operators of existing sour gas processing facilities will be expected to cooperate in the assessment of alternatives, including the evaluation of upgrading existing facilities to accommodate related sour gas volumes. Issues related to additional volumes "triggering" an upgrade of grandfathered sulphur recovery capability in an existing gas plant that otherwise could feasibly process the gas may not be accepted by the EUB as justification for construction of a new plant or the economic stranding of developable sour gas reserves. In such situations it is expected that all producers using the facility will equitably share costs of degrandfathering the plant.

Proponents must contact other reserve operators in the area, assess longer-term gas processing needs, and account for regional processing needs in the design of proposed new facilities. As a minimum, the area to be assessed must be consistent with industry notification requirements for sour gas plants, as described in EUB *Guide 56*.

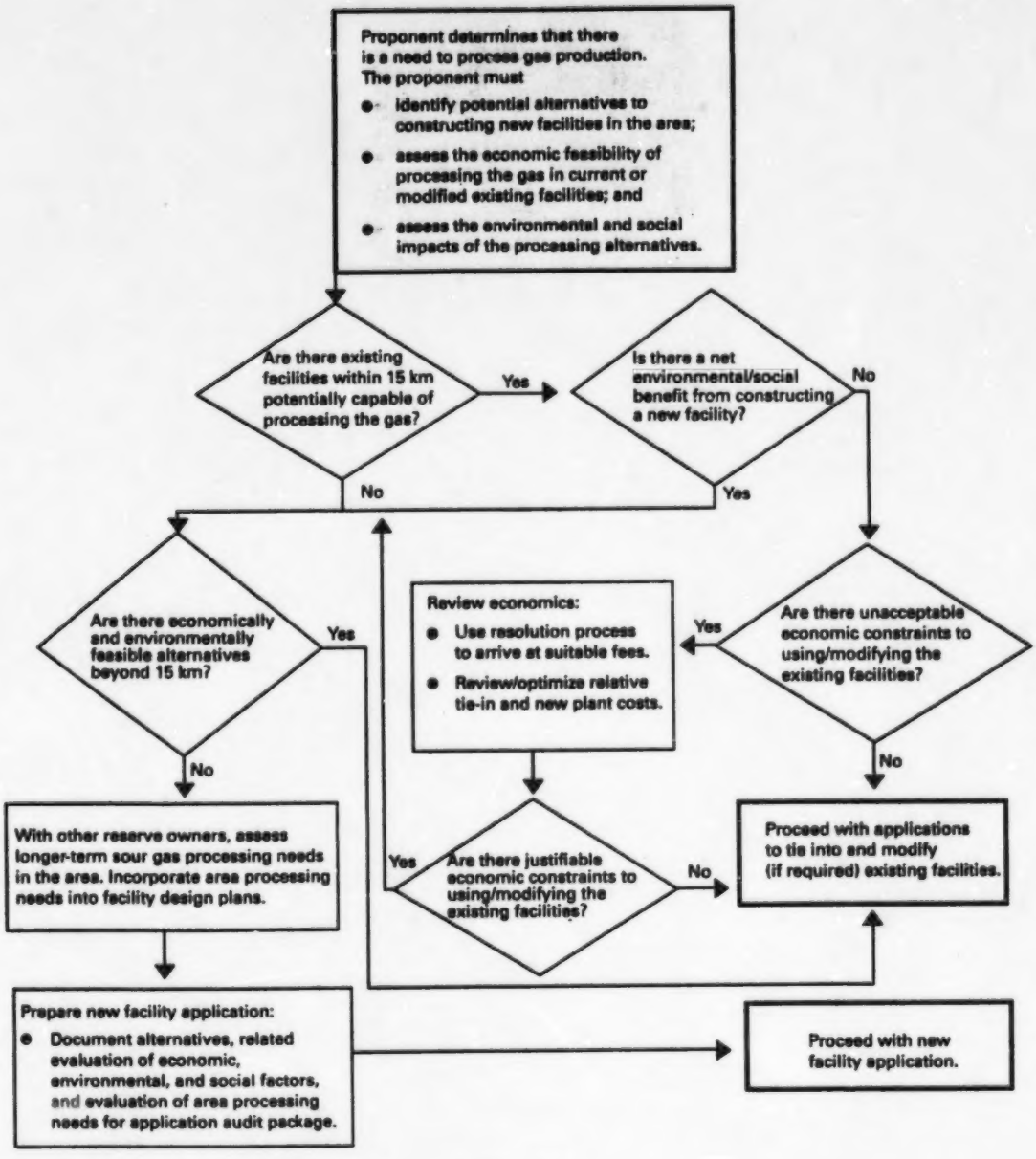
Proponent determines that there is a need to process gas production. The proponent must
Identify potential alternatives to constructing new facilities in the area;
assess the economic feasibility of processing the gas in current or modified existing facilities; and
assess the environmental and social impacts of the processing alternatives.
Are there existing facilities within 15 km potentially capable of processing the gas?
Yes
Is there a net environmental/social benefit from constructing a new facility?
No
No
Yes
Are there economically and environmentally feasible alternatives beyond 15 km?
Yes
No
Review economics:
Use resolution process to arrive at suitable fees.
Review/optimize relative tie-in and new plant costs.
Yes
Are there unacceptable economic constraints to using/modifying the existing facilities?
No
With other reserve owners, assess longer-term sour gas processing needs in the area. Incorporate area processing needs into facility design plans.
Yes
Are there justifiable economic constraints to using/modifying the existing facilities?
No
Proceed with applications to tie into and modify (if required) existing facilities.
Prepare new facility application:
Document alternatives, related evaluation of economic, environmental, and social factors, and evaluation of area processing needs for application audit package.
Proceed with new facility application.

**Figure 2. Plant proliferation assessment process**

## 6 Enforcement

The following enforcement actions will be undertaken on plants that fail to meet requirements relating to sulphur recovery and sulphur inlet rates. Actions described in Section 6.1.1 were in effect prior to the date of this document, while Sections 6.2.1 and 6.2.2 will be enforced as of the dates specified below.

## 6.1 Rules Applying to All Gas Processing Plants with Sulphur Inlets Greater Than 1 tonne/day

### 6.1.1 Failure to Meet the Approved Calendar Quarter-Year Sulphur Recovery Efficiency (as specified in plant approval)

1) If the sulphur recovery requirement is not met in any calendar quarter year, the operator must file with the EUB Operations Group, Production Operations Section, a letter describing the causes of the noncompliance and explain what actions will be taken to ensure that requirements are met in future quarters.

2) If sulphur recovery approvals are not met for two calendar quarter-year periods in a rolling 12-month period, the operator must notify the EUB Operations Group, Production Operations Section. EUB staff will meet with the operator's senior operating and technical personnel to review operations and actions taken to correct the noncompliance. In addition, the EUB will notify the operator that failure to meet the approved sulphur recovery levels for another calendar quarter year in the next 12-month period will result in a 30 per cent reduction in the raw gas inlet for a period of 90 days or suspension of the plant approval.

### 6.1.2 Exceedance of the maximum daily sulphur inlet capacity or design (specified in last approval or *Guide 56* application)

1) If the maximum daily sulphur inlet rate is exceeded for one or more days in any calendar quarter year, the operator must file with the EUB Operations Group, Production Operations Section, a letter describing the causes of the noncompliance and explain what actions will be taken to ensure that future exceedances do not occur.

2) If the maximum daily sulphur inlet rate is exceeded in another month in a 12-month period, the operator must notify the EUB Operations Group, Production Operations Section. EUB staff will meet with the operator's senior operating and technical personnel to review operations and actions taken to correct the noncompliance. In addition, the EUB will notify the operator that failure to meet the maximum daily sulphur inlet capacity for another calendar quarter year in the next 12-month period will result in a 30 per cent reduction in the raw gas inlet for a period of 90 days or a suspension of the plant approval.

## 6.2 Rules Applying to All Grandfathered Gas Processing Plants with Approved Sulphur Inlets Greater Than 1 tonne/day

### 6.2.1 For the period of January 1, 2001, through September 30, 2005

Grandfathered gas plants exceeding 125 per cent of the baseline sulphur inlet in the period between January1, 2001, and September 30, 2005, will be subject to the following:

1) If the calendar quarter-year daily average sulphur inlet exceeds 125 per cent of the baseline, the operator must file with the EUB Operations Group, Production Operations Section, a letter describing the causes of the noncompliance and explain what actions will be taken to ensure that future exceedances do not occur.

2) If the calendar quarter-year daily average sulphur inlet exceeds 125 per cent of the baseline in another calendar quarter year in a 24-month period, the operator must notify the EUB Operations Group, Production Operations Section. EUB staff will meet with the operator's senior operating and technical personnel to review operations and actions taken to correct the noncompliance. In addition, the EUB will notify the operator that if the sulphur inlet exceeds 125 per cent of the baseline for another quarter in the next 24-month period it will result in a 30 per cent reduction in raw gas inlet for a period of 90 days or a suspension of the plant approval.

### 6.2.2 As of October 1, 2005

Subsequent to September 30, 2005, grandfathered gas plants that do not meet Table 1 sulphur recovery levels must not exceed the Maximum Grandfathered Capacity as defined in Section 3.1 in any calendar quarter year. Should this occur, the following requirements will apply:

1) If the calendar quarter-year average daily sulphur inlet exceeds the Maximum Grandfathered Capacity, the operator must file with the EUB Operations Group, Production Operations Section a letter describing the causes of the noncompliance and explain what actions will be taken to ensure that future exceedances do not occur.

2) If the calendar quarter-year average daily sulphur inlet exceeds the Maximum Grandfathered Capacity in another quarter in a 24-month period, the operator must notify the EUB Operations Group, Production Operations Section. EUB staff will meet with the operator's senior operating and technical personnel to review operations and actions taken to correct the noncompliance. In addition to meeting with the operator's senior staff, the EUB will notify the operator that failure to meet the quarterly grandfathered capacity for another quarter in the next 24-month period will result in a 30 per cent reduction in raw gas inlet for a period of 90 days or a suspension of the plant approval.

## 6.3 AENV Enforcement

All incidents of noncompliance with approval conditions (e.g., exceedance of $SO_2$ emission limits) and all contraventions of the Alberta Environmental Protection and Enhancement Act and regulations will lead, where appropriate, to an investigation. That investigation may lead to any number of enforcement responses, including remedial measures, such as environmental protection orders, for the proactive prevention of environmental problems, administrative actions to deter and punish offenders, including warning letters, administrative penalties, and enforcement orders, and prosecutions for the most serious offences.

# 7 Information Contacts

Please direct questions of the EUB to Kim Eastlick at (403) 297-4325 or to Jim Spangelo at (403) 297-3566. Direct questions related to application of the sulphur recovery guidelines by Alberta Environment to Randy Dobko, Environmental Sciences Division, Alberta Environment, at (780) 427-6869.